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(54) **Multifunctional rotating planes on a suspended supporting structure**

Multifunktionale rotierende Ebenen an einer aufgehängten Tragstruktur

Plans de rotation multifonctionnels sur structure de support suspendue

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Description

[0001] The structure that I have planned finds it place in the ambit of the furniture subject-matters and finds among its "next ancestors", the table, the desk, the workbench, the sales desk, etc. FR1147375A discloses a table having rotating panels overhanging from a supporting structure. The direct ancestor of the realized prototype is the common industrial production table, for 4 persons (80 x 80 x 75cm). Analyzing industrial products we notice, however, that it is an element of static furniture, that it is meant to occupy an area of 0.8 m^2, and occupies the space of the classical 4 support legs or of the various bases of support.

[0002] Viceversa the structure carried out by me is multifunctional, ergonomic, eco-compatible, versatile and presents innovative dynamics.

[0003] This invention presents simple lines and geometric shapes, not conditioned by aesthetic factors (which among other things make them adaptable to any environment and furniture), but not at all accidental.

[0004] Specifically it consists of two rotating panels, positioned on a supporting suspended element in the form of a triangular section (Tab. 1, fig. 1).

[0005] In the prototype as seen in the drawings and the renderings, realized entirely in wood lump, the rotating panels present a longitudinal cut, with thickness that goes gradually reducing itself until arriving to 2.5 cm in order to allow for the overhang (Tab.3, fig.1(X,S,Sb)), and a semicircular cut to an extremity in order to concur the rotation (Tab.3 fig.2(A)), and they have respectively a length of 120 cm and a width of 40 cm (Tab.3, fig. 1 e 2).

[0006] The suspended support element is presented, instead, as a hollow pyramid whose cross section is an isosceles triangle, with the vertex pointing downwards and whose base has the length equal to the double of the width. In the prototype the length of the base is 80 cm and the width is 40 cm while the height of the cross section of the pyramid is 50 cm (Tab.2, fig.1, 2 e 3). The vertex angle is, instead, 77° (Tab.1, fig.1(B) e Tab.2, fig.1). The dimensions of the support surface are directly proportional to the dimensions of the rotating panels. This element has been fixed to the wall but can also be fixed to an eventual movable support (which would concur the rotation of 180° of the rotating panels), and presents some small shelves that act as ulterior planes of support (Tab. 1, fig.1(O))

[0007] There is, finally, a strip of wood for closing positioned as in table 1, fig. 1, this is also realized in wood lump, with a length of 80 cm and a thickness of 3 cm, shaped to finishing at the two extremities. According to the various requirements of who commissions the embodiment of the structure, the closing strip can be planned in order to act as a salt shaker, oil holder or for a courtesy light (consider as an example the use of a different material, such as plexiglass, that would concur to lodge a neon inside).

[0008] The two axes are capable of carrying out a rotation of 90° (or 180°, if the structure is applied on a movable support) thanks to a bearing in steel of industrial production used for the operation of great gates in iron or doors, handicraft modified in order to adapt it to the function it must carry out.

[0009] The modification consists in welding a cylindrical tube in solid steel in the central part of the closing cap of the bearing (the dimensions vary according to the dimensions given to the rotating panels) and in realizing 4 passage holes and one male thread at the tip (Tab.2, fig.4(C,D,E)).

[0010] The holes serve for the fixing of the modified bearing in the housings of the rotating panels (Tab.2, fig.4 e Tab. 3, fig.1(F)).

[0011] It is clearly a dynamic structure because occupying, to the occurrence, a surface of 0,8 m^2 like an industrially produced table, thanks to a rotation of 90° of the two panels, the bulk is immediately eliminated, transforming themselves into a single wide suspended shelf that renders it a such an element of furniture and an ideal solution for environments of modest dimensions, in which an industrial table could turn out to be not very functional, not leaving enough space for circulation to guarantee anyone full freedom of movement (Tab.4, fig.1).

[0012] At the same time it is also a versatile structure because it can satisfy various requirements, being able to be used, according to the desired usefullness, as a dining table, or desk or ironing board (using the rotation of a single plane or, to the occurrence of both) etc. In this regard the prototype shown in the photographs has two asymmetric panels because one of them is able to be used as ironing board.

[0013] Differently, then, of the common industrial production table, that adapts perfectly only to the physical characteristics of a person of medium stature (1,75 m approximately), my rotating panels can be regulated also taking into account the various physical requirements of those who use them and therefore they present themselves as an ergonomic structure. For example if we have an individual with a height of 2,00 m, the optimal height of use for being able to eat or to write is not 75 cm from ground, like normally previewed in the industrial production of a common table, but it is of 80/83 cm, and therefore it is to such height that the rotating axes will be positioned.

[0014] Also the triangular shape given to the support element is not fruit of an accidental choice, but it has been planned taking into account the human body structure. Thinking, in fact, in particular of the possibility of use of the rotating panels, such as a dining table for 4 persons at the same time and therefore of the requirement to leave a space necessary for the knees in order to allow the person to sit near enough to the rotation panels, I have thought that the triangular section cut of the support element pits the ideal solution.

[0015] The structure planned by me is also presented as an element of multifunctional furniture, seeing as it can be regulated in height, starting from a minimal height of 50 cm and arriving beyond the metre, and eventually

varying also in the dimensions, it lends itself to various applications: fixing, as an example, the height of use to 90 cm from ground we obtain an innovative work-bench or desk with the characteristics already described; increasing, instead, the dimensions of the rotating axes and suspended support element, as an example, of approximately 2 times regarding the prototype of which to the drawings, and lowering the utility quotient, we could realize two single beds that thanks to the rotation of the rotating planes are transformed into a characteristic double bed; on the contrary, reducing opportunely some dimensions we could obtain a useful and versatile bedside table.

[0016] But even by notably reducing the dimensions and using precious materials, given its characteristic shape, we could succeed in placing this idea also in various ambits, such as among the subject-matters of ornaments, obtaining a pendant or a pair of earrings.

[0017] It is an element of furniture that can be planned in nearly all the types of wood let alone in steel, iron, aluminium, carbon, various polycarbonates, or a mixture of these elements, and just for this ability to adapt itself to very many materials it can be defined an eco-compatible product.

[0018] The prototype of which to the drawings has been realized in red pine, seeing as I think that such type of wood has the excellent characteristics for experiments like mine, presenting a specific weight lighter in respect to other essences, but also a remarkable elasticity and all to the minimal and competitive cost.

[0019] The functionality of the rotating panels is given from the proportion between the dimensions of the rotating panels and the support element (variable data according to the various requirements).

[0020] In the prototype in wood, the two axes are respectively characterized by a width of 40 cm and a length of 120 cm, with a starting thickness of 5 cm and a final thickness equal to 2,5 cm (Tab.1, fig.1(X,S) e Tab.3, fig.1(X,S)). The suspended support element presents, instead, a base with a length of 80 cm and a height of 40 cm.

[0021] The thickness at the origin of the rotating axes has been calculated according to the following equation:

$$Sb: L = X: S$$

$$X = (Sb \times S)/L$$

Legend:

Sb = overhang (part of the rotating panels overhanging from support element);
L = width of the panels and suspended support element;
X = thickness at the origin of the panels;
S = final thickness of the panels.

[0022] In my prototype the X have been, therefore, calculated in the following way:

$$80 : 40 = X: 2.5$$

$$X = (80 \times 2{,}5) /40$$

$$X=5$$

[0023] If we wish to obtain a greater overhang, for example of 100 cm, according to the proportion of my working prototype, we will have that:

$$100 : 40 = X: 2.5$$

$$X = (100 \times 2.5) /40$$

$$X = 6.5$$

[0024] A greater thickness at the origin will be therefore necessary for having a overhang of a metre.

[0025] Obviously it is possible to obtain as overhang any intermediate size according to the various structural requirements.

[0026] But If we want to realize my rotating panels to overhang so as to form with the rotation a wider table or a counter, we notice that based on the above mentioned equation the thickness at the origin of the panels diminishes with the increasing of the width of the support element.

[0027] Assuming, in fact, we want an overhang of 80 cm and having, however, a support element with a width of 45 cm, the thickness at the origin will be equal to 4.4 cm based on the equation:

$$80 : 45 = X: 2.5$$

[0028] If we wanted, instead, to approach the same proportions of my prototype in wood, it would be enough to increase the final thickness by 3 millimetres

$$80 : 45 = X: 2.8$$

[0029] This demonstrates that small variations of even a single one of the dimensions of the rotating panels determine a variation of the dimension of the thickness at

the origin of the same.

[0030] Obviously the dimensions of the axes and the suspended support element would vary in a still more sensitive way if for my prototype you use other types of material. If, as an example, we realized the rotating panels to overhang in iron we could have the same overhang and the same load of the prototype in wood as in the drawings, but with an initial thickness and a final thickness of the planes by far inferior.

[0031] However it does not seem opportune in relation to the final thickness of the planes, to come down to under 2.5 cm, because otherwise we would have a structure not in compliance with the safety standards, because the extremity would be too thin and therefore dangerous. Therefore I think that the final thickness constitutes a variable element but only in increasing size regarding my prototype of 2.5 cm.

[0032] I could continue to the infinite with the algebraic examples and the hypotheses of applications but I think that what I have written is sufficient to illustrate the potentialities and the innovation of my rotating panels, capable, thanks to the above cited characteristics, of transforming the space to which they are destined.

LEGEND:

[0033]

Tab. 1 (fig. 1) = front perspective of the multifunctional rotating panels on a suspended supporting structure;
Tab. 2 (fig. 1) = front perspective of the supporting suspended structure;
Tab. 2 (fig. 2) = inserted back panel of the supporting suspended structure, thickness 3 cm;
Tab. 2 (fig. 3) = plan of the supporting suspended structure;
Tab. 2 (fig. 4) = solid steel bearing with the applied modifications;
Tab. 3 (fig. 1) = central section of the rotating panels;
Tab. 3 (fig. 2) = plan of the rotating panels
Tab. 4 (fig. 1)= rotation of the rotating panels and the area they occupy;

A = circular cut of the rotating panels;
B = vertex of the carrying triangular section suspended structure;
C = cylindrical tube with threaded tip;
D = welding point of the cylindrical tube with the threaded tip inside the cap of the solid steel bearing;
E = no. 4 holes for the fixture of the cap of the solid steel bearing to the rotating panel;
F = lodging of the cap of the solid steel bearing positioned under the rotating panels;
G = closing plug of the solid steel bearing which has a hole positioned in the central part for the passage of the cylindrical tube and located on the base of the suspended supporting structure;
H = self-blocking bolt for the fixture of the rotating panels onto the suspended supporting structure;
I = safety catch chiselled down to nothing at the extremities;
L = width of the rotating panels and of the base of the carrying triangular section suspended element;
l = length of the base of the carrying triangular section suspended element;
M = anchorage holes on a fixed or mobile structure
N = inserted back panel, thickness 3 cm
O = beehive structure, thickness 2 cm
P = steel washer, diameter 5 cm
R = plug lodging for the closing of the solid steel bearing
S = final thickness of the rotating panels;
Sb = suspended part, part of the rotating panels which protrude from the carrying element;
X = original thickness of the rotating panels.

Claims

1. Multifunctional rotating panels on a suspended supporting structure composed of:

- two rotating panels having a lengthways cut whose thickness (X, S) decreases gradually to allow for suspension and with a circular cut (A) at the base (A) to allow for rotation;
- a suspended supporting structure with a triangular section cutting with the vertex (B) pointing downwards and with a base having the width (L) and length (l) directly proportional to these rotating panels according to the equation Sb:L=X:S; by which X = (Sb x S)/L, wherein Sb is the length of the overhang part of the rotating panels overhanging from the suspending supporting structure, L is the width of the panels and of the base of the supporting structure, X is the thickness at the origin of the panels and S is the final thickness of the panels, the supporting suspended structure having moreover a posterior inserted panel (N) which has 3 anchorage holes (M) for fixing to a fixed or mobile structure;
- solid steel bearing with a cylindrical tube (C) threaded at the tip and welded in the central part of the cap of the bearing (D) which has in turn 4 holes (E) located in central lodgings (F) of the rotating panels, a closing plug (G) of the solid steel bearing which has a hole positioned in the central part for the passage of the cylindrical tube and located on the base of the supporting suspended structure, a self-blocking bolt (H) for the fixing of the rotating planes onto the base of

the supporting suspended structure; which screws into the threading of the above mentioned cylindrical tube (C), and wherein by either tightening or loosening it the resistance to rotation of the panels either increases or decreases.

2. Multifunctional rotating panels on a supporting suspended structure as described in claim 1 with a safety catch chiselled down to nothing at the extremities.

3. Multifunctional rotating panels on a suspended supporting structure as described in one of the above claims with the application of the suspended supporting element on a fixed or mobile support.

4. Multifunctional rotating panels on a suspended supporting structure as described in one of the above claims made in material which is resistant to flexibility both in metals and non-metals.

Patentansprüche

1. Multifunktionale rotierende Ebenen an einer aufgehängten Tragstruktur, bestehend aus:

   - zwei drehbaren Platten (Ebenen) (Tab.4, Fig.1), deren Plattenstärke (X, S) sich gegen Ende zu verjüngt, um das Gewicht gegen das auskragende Ende zu verringern, und die zur Mitte hin (A) halbrund ausgeschnitten sind, um die Drehung zu ermöglichen;
   - einer auskragenden, aufgehängten Tragstruktur mit dem Schnitt eines Dreiecks (Tab.1, Fig.1 und Tab. 2, Fig.1), die Spitze (B) nach unten, dessen Basisbreite (L) und Länge (1) direkt proportional zu den rotierenden Platten sind, und zwar gemäß der Gleichung Sb:L=X:S, d. h. X=(Sb x S)/L (Sb= auskragender, die Tragstruktur überragender Teil der drehenden Platten; L= Breite der Platten und der aufgehängten Tragstruktur; X= anfängliche Plattenstärke (mittelseitig); S= Plattenstärke an deren äußeren Enden); zur Tragstruktur gehört ebenfalls ein eingelassenes Wandpaneel (N) mit drei Befestigungslöchern (M) zur Montage an fester oder beweglicher Struktur;
   - zwei Stahl-Kugellager mit Gehäuse, mit einem in der Mitte des Kugellagergehäuses (D) angelöteten zylindrischen Stahlrohr (C) mit einem Außengewinde am Ende und 4 Befestigungslöchern (E), das in den zentralen Aussparungen (F) der auszudrehenden Platten platziert ist; auf der Basis der Tragstruktur angebrachte Abdeckung (G) des Kugellagers mit Loch in der Mitte für das Stahlrohr (Tab. 2, Fig.3); automatisch blockierende Mutter (H), für die Befestigung der rotierenden Platten auf der aufgehängten Tragstruktur, die auf dem Außengewinde des oben genannten zylindrischen Rohrs aufgeschraubt wird, und die durch Anziehen oder Lockermachen den Widerstand der Drehung erhöht oder vermindert;

2. multifunktionale rotierende Ebenen auf aufgehängter Tragstruktur gemäß Antrag 1 mit Sicherheitsleiste, die sich gegen die Enden zu verjüngt (Tab.1, "I");

3. multifunktionale rotierende Ebenen auf aufgehängter Tragstruktur gemäß eines der vorangehenden Anträge mit Befestigung der Tragstruktur auf festem oder beweglichem Element;

4. multifunktionale rotierende Ebenen auf aufgehängter Tragstruktur gemäß eines der vorangehenden Anträge, hergestellt aus biegungsresistentem Material, entweder aus Metall oder aus anderen Materialien.

Revendications

1. plans de rotation multifonctionnels sur structure de support suspendue composée de:

   - deux plans de rotation (tab. 4 fig. 1) dont l'épaisseur (K, S) diminue progressivement à l'extrémité afin de permettre la suspension et une coupe circulaire à la base (A) pour permettre la rotation ;
   - une structure de support suspendue avec coupe à section triangulaire (tab. 1, fig. 1 et tab. 2, fig. 1) au sommet (B) dirigé vers le bas et, dont la base a la largeur (L) et la longueur (1) directement proportionnelles à celles des plans de rotation selon l'équation Sb : L = X : S ; et donc X = (Sb x S)/L (Sb = partie des plans de rotation de la structure de support en surplomb ; L = largeur des plans et de l'élément de support suspendu ; X = épaisseur d'origine des plans ; S = épaisseur finale des plans) ; la structure de support suspendue a également un panneau postérieur inséré (N) avec 3 trous d'ancrage (M) sur une structure fixe ou mobile ;
   - roulement blindé en acier avec tube cylindrique (C) avec extrémité filetée, soudé au centre du couvercle de roulement(D) percé de 4 trous (E) placé au centre du boîtier de palier des plans de rotation (F) ; bouchon de palier (G) du roulement blindé qui est percé au centre afin de permettre le passage du tube cylindrique et placé sur la base de la structure de support suspendue (tab. 2, fig. 3) ; écrou de blocage (H) pour fixation des plans de rotation sur structure de support en surplomb ; vissé au tube cylindrique fileté, susmentionné et, qui serré ou desserré, augmente

ou diminue la résistance à la rotation ;

2. plans de rotation multifonctionnels sur structure de support suspendue, selon la revendication 1, comprenant un petit support de sécurité, moulé aux extrémités (tab. 1, lett. I) ;

3. plans de rotation multifonctionnels sur structure de support suspendue, selon l'une des revendications précédentes, avec application de l'élément de support suspendu sur support fixe ou mobile ;

4. plans de rotation multifonctionnels sur structure de support suspendue, selon l'une des revendications précédentes, fabriqués avec un matériau, qu'il soit en métal ou non, résistant en flexion.

Multifunctional rotating planes on a suspended supporting structure

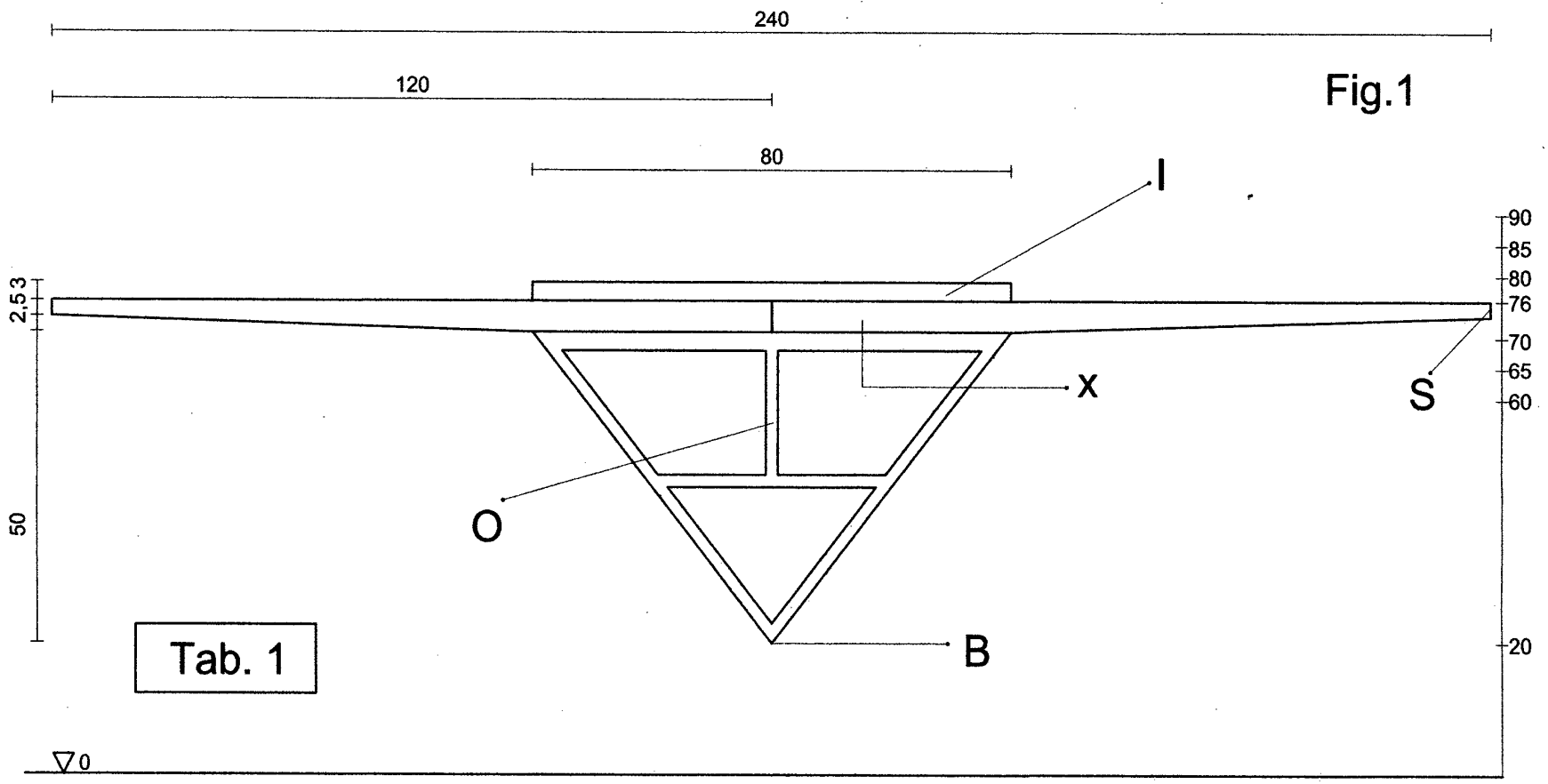


Fig.1

Tab. 1

Scale 1:10 measurements expressed in cm

Multifunctional rotating planes on a suspended supporting structure

Fig.1

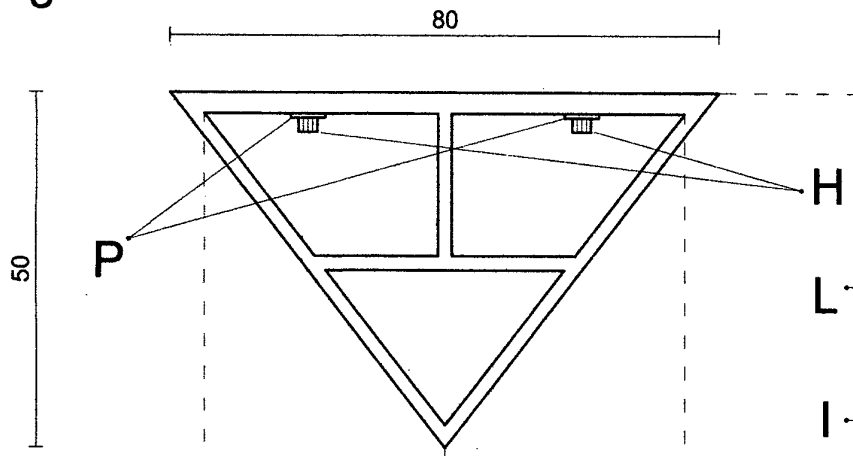


Fig.3

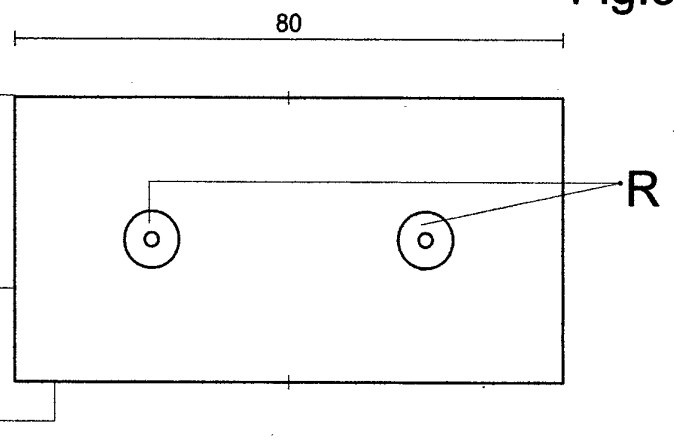
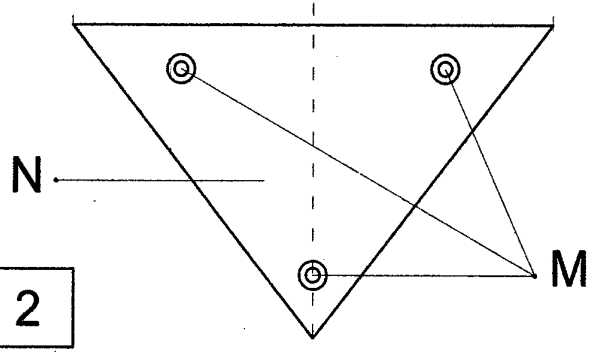
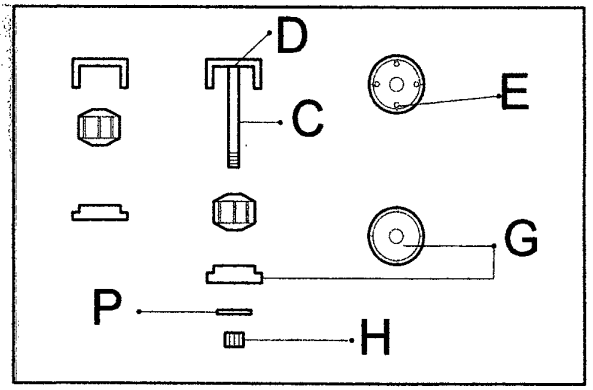


Fig.2



Tab. 2

Fig.4



Scale 1:10 measurements expressed in cm

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Multifunctional rotating planes on a suspended supporting structure

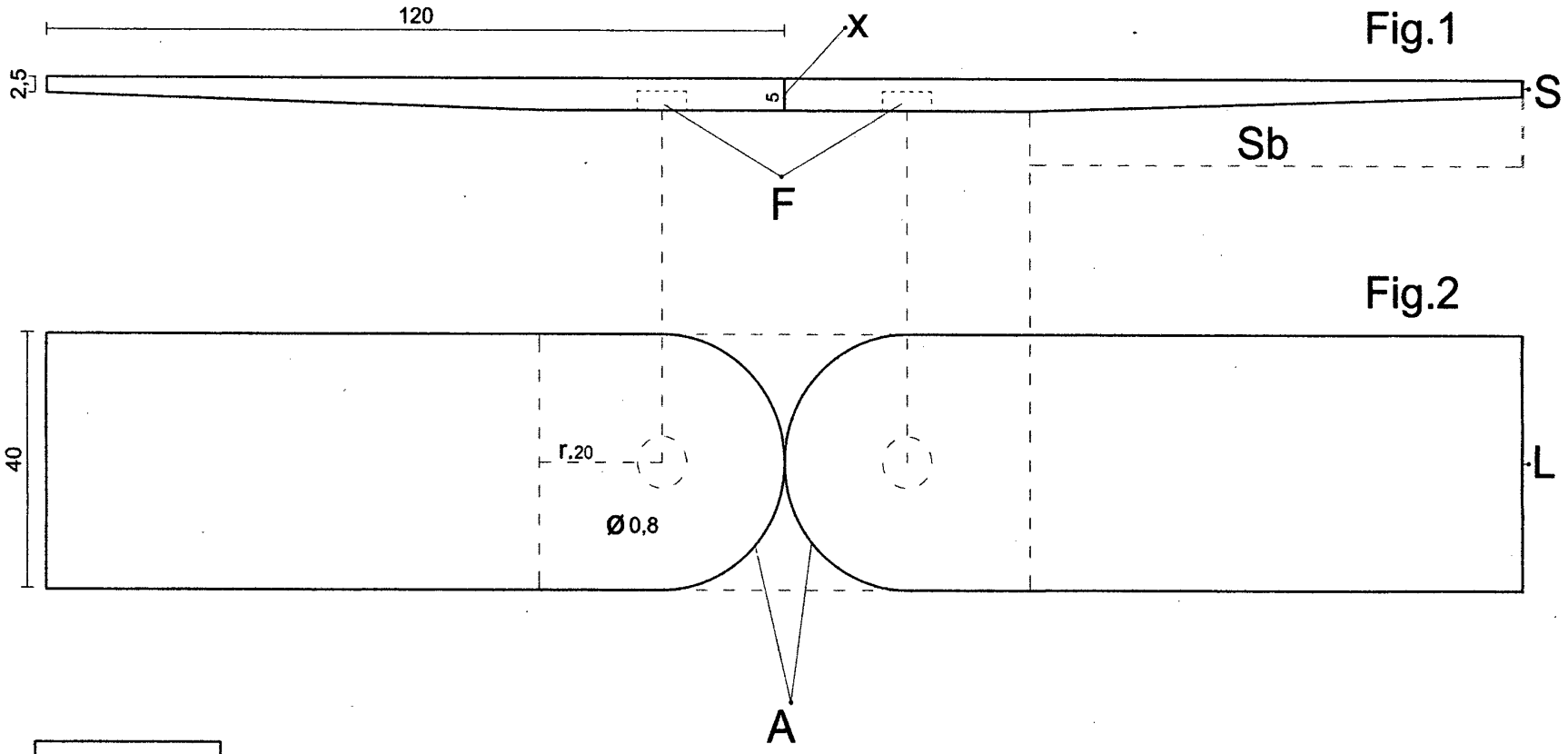

Fig.1

Fig.2

Tab. 3

Scale 1:10 measurements expressed in cm

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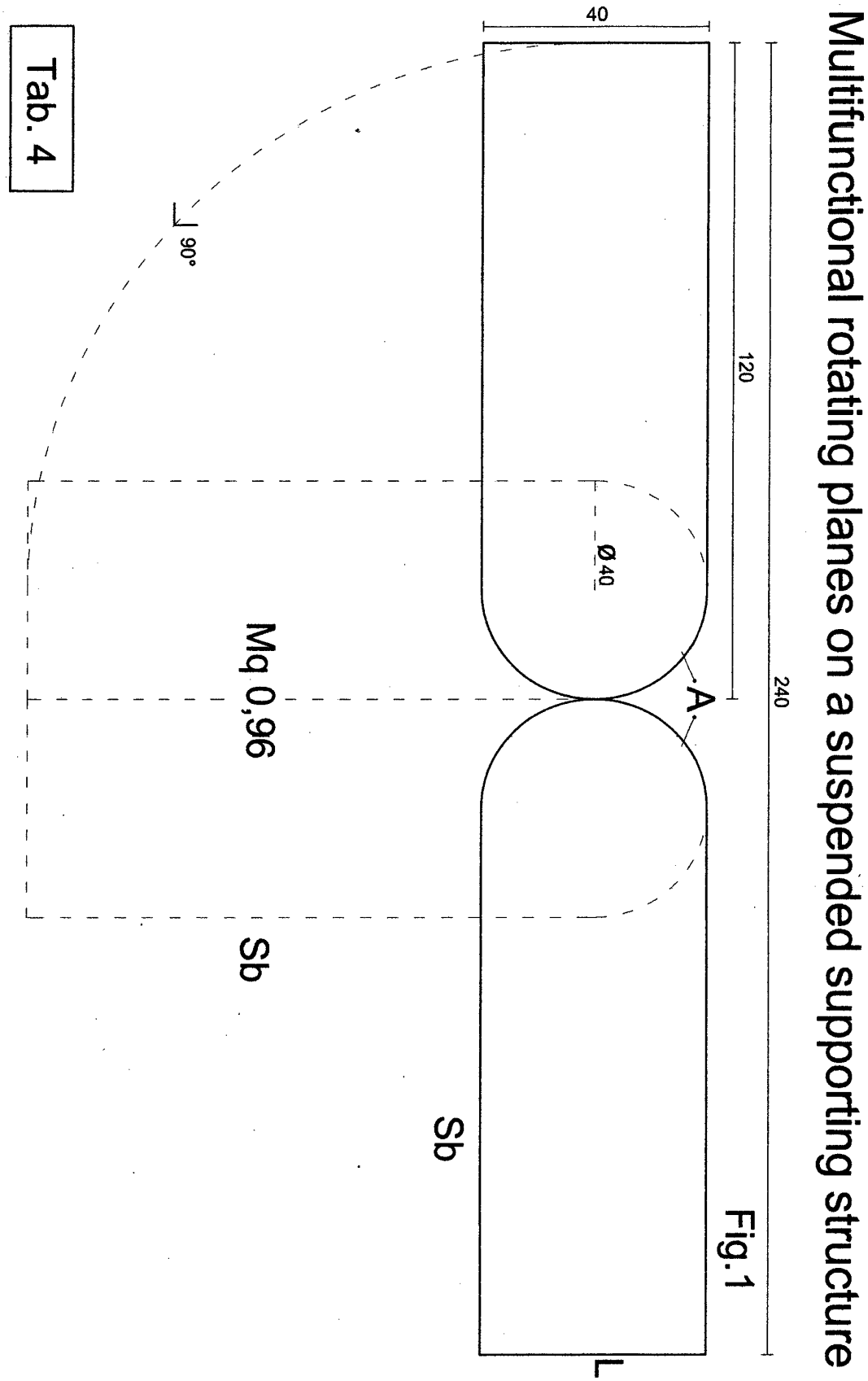

Multifunctional rotating planes on a suspended supporting structure

Fig.1

Tab. 4

Scale 1:10 measurements expressed in cm

REFERENCES CITED IN THE DESCRIPTION

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