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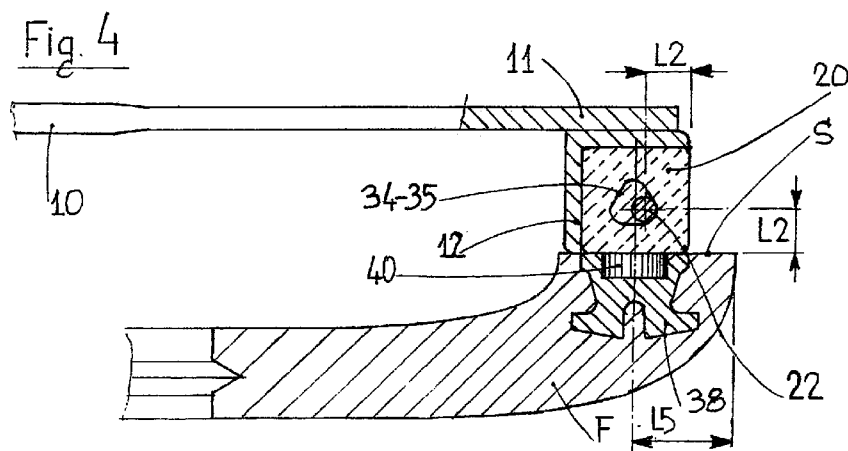
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(57) Abstract: Frame for eyeglasses with temples (10) having the connection end (11) to the front part (F) provided with a squared seat (13) for the housing of a movable magnetic element (20), said magnetic element (20) being squared and, in turn, housed within a second seat (36) which is formed by two walls (32, 33) and a bottom (34), and being engaged to said walls (32, 33) by a pin (22) which passes through an eccentric hole (21) of the same magnetic element (20) and whose projecting ends (22a, 22b) are accommodated within a pair of triangular-shaped cam holes (34, 35) that are formed on the same walls (32, 33).



SPECTACLE FRAME

DESCRIPTION

The present invention relates to a spectacle frame.

In particular, the frame is provided with an innovative articulation between the temples and
5 the front part of the frame.

In the traditional technique for producing glasses the articulation between the rods or temples and the lateral extremities of the front part is achieved by means of the alignment of eyelets disposed at the ends of the temples with eyelets disposed at the ends of the front; a pin or a screw is inserted between the aligned eyelets so as to permanently join the ends of the temples
10 at the ends of the front, enabling the opening and closing of the temples on the front of the eyeglasses.

EP 0096928, EP 0262099, EP 0395393, EP 1556729 describe elastic hinges, which make the use of glasses more comfortable. The solutions described in these documents are provided with a spring or an elastic means.

15 US 5073020, WO 97 043683 describe frames in which one of the eyelets of the temple or of the front part is provided with an end which extends and which is bent as a pivot. Even in this case, an elastic means and a screw or pin are necessary for the hinging of the temples to the lenses, so as to unite and make elastically swivel the eyelets of the temples on the eyelets of the front part of the glasses. The assembly of the glasses is difficult for the operator, because
20 it is necessary to apply the elastic means with a small screw or a small pin in uncomfortable working conditions, because a previous alignment of the eyelets is necessary. Centering errors are possible, with losses of time and incidence on the costs of processing and assembly of the glasses; such drawback is frequent also in the normal maintenance of the glasses.

Another drawback of the current technique is that frequently, using the glasses, the screws
25 become loosen and the temple detaches from the frame, so making the glasses unusable, requiring the intervention of an optical or a person competent and suitably equipped.

A further drawback of this current technique, in which the hinging is made by means of a pin or a screw, is the substantial non- interchangeability between the front and the temples; in fact, it is very complex to replace the temples of the glasses to adapt the shape or the color of
30 the same to the dress of the person wearing the glasses.

CA 2321318 describes another technique for hinging the temples to the front part. In this document the connection between the temple and the front part comprises a cylindrical ferromagnetic element placed at the end of a temple, and a corresponding cylindrical seat placed at the end of the front part to accommodate said ferromagnetic element. Even this

solution has drawbacks. A first drawback is related to the strength of the magnet; in fact a small magnet has a low attraction force, while a more powerful magnet has a disproportionately size compared to a normal hinge of the glasses. Another drawback is caused by the lack of an orthogonal matching portion in order to prevent the slippage of the temple with respect to the front part.

One of the aims of the present invention is to realize a spectacle frame that allows an easier, faster and safer union of the temples at the front part of the eyeglasses, ensuring a twitch movement for the normal opening and closing operations, both during manufacture and assembly and during use or maintenance, without requiring the application and insertion of elastic means and of screws or pins between their respective hinge elements.

Another important aim of the present invention is to realize an eyeglass frame that can ensure the best conditions for a good operation and a secure positioning of the temples, in their various stages of closing, opening and maximum opening in respect to their front part, while allowing such twitch movement.

Another aim of this innovation is to realize a spectacle frame combined with a series of several interchangeable temples for each type of front part; the same temples can have, for example, different shapes or colors, with the same temples which are easily replaceable so changing shape or color.

The aims of the present invention are achieved by means of a spectacle frame, comprising two temples and a front part connected together via a coupling of magnetic type in order to allow the positioning of the temples relative to the ends of the front at least in an open configuration and in a closed configuration; said coupling of magnetic type comprises: a first seat defined by two walls of ferromagnetic material that form an angle between them; a magnetic element shaped complementarily to said seat so as to be coupled by magnetic attraction to the seat itself; a hinge portion, provided with a second seat for said magnetic element; fixing means disposed and acting between said magnetic element and said hinge portion, able to connect stably the magnetic element to said hinge portion, allowing the said element to rotate inside said second seat to allow the change of configuration of the temples with respect to the front.

According to one embodiment of the invention, said first seat is disposed on said temple and said hinge portion is disposed on said front part.

According to another embodiment of the invention, said first seat is instead disposed on said front part and said hinge portion is disposed on said temple.

Advantageously, said first seat is formed by a transverse portion of an angular section bar of steel or other ferromagnetic alloy.

Advantageously, the walls forming said first seat extend for a first value; the second seat is delimited by two walls spaced apart by a second value; and said magnetic element has a substantially parallelepiped shape, with a first dimension corresponding to said first value of the first seat and the other dimension corresponding to the second value of the second seat.

- 5 Advantageously, said walls that define the second seat are provided with holes having a substantially triangular rounded cam shape, said magnetic element being engaged to said walls by a pin that passes through an eccentric bore of the magnetic element; the ends of said pin being housed within said holes.

These and other advantages and features of the present invention will be best understood by
10 anyone skilled in the art from the following description and with the help of the attached drawings given as a practical exemplification, but not to be considered in a limiting sense, in which:

- Fig.1 is a partial perspective view of a temple according to the invention; in the drawing is shown the proximal end, intended to the hinging with the front part of the frame of the
15 glasses;

- Fig.2 is a perspective view of a magnetic element to be interposed between the hinging end of the temple of Fig.1 and the side end of the front part of the glasses on which the same temple of Fig.1 engages;

- Fig.3 is a perspective view of the portion of the hinge to be incorporated at the end of the
20 front part of the glasses, and intended to receive the magnetic element of Fig. 2 ;

- Fig.4 is a partial plan view with parts in transparency of the temple of Fig.1 associated to a front part by means of the magnetic element of Fig.2 and the hinge portion of Fig.3;

- Figs. 5, 6, 7 are partial views in plan view with parts in transparency of the same temple associated with the front part of the eyeglasses; the temple is represented, respectively, in its
25 unstable condition in a twitch movement (Fig.5) previously to the closing position shown in Fig.4, in its normal open configuration (Fig. 6), in its condition of maximum open configuration (Fig.7);

- Fig.8 is a plan view, detailed and enlarged, of a part of the hinge portion of Fig.3, represented fixed to the front part of the eyeglasses .

30 With reference to the examples of the drawings, an end (11) of temple (10) for eyeglasses is integrally joined, for example by welding or mechanical fastening, to a transverse portion of an angular section bar (12) of steel or other ferromagnetic alloy, preferably having equal sides, which is adapted to form its internal rectangular compartment or angular open seat (13) (also called first seat in the present description) .

A substantially cubic element (20) is made of magnetic material with the side (L) which corresponds substantially to the side (L) of the open seat (13) and which is provided with a transverse through hole (21); the through hole (21) is realized eccentrically, with the distances (L1) that are approximately equal to 6/10 of (L) and with the distances (L2) which are approximately equal to 4/10 of (L). The hole (21) of the magnetic element (20) is adapted to accommodate a plug or pin (22) that is associated with said magnetic element (20), with minimum interference and only during the assembly of the temple (10) to the hinge portion (30), as specified below. The diameter of the hole (21) substantially corresponds to the diameter (r) of the pin (22) so as to allow the introduction of the pin (22) into the element (20) and its integral fixing to the same element (20).

In practice, the proximal end (11) of the rod (10) is provided with a seat (13) which has a profile complementarily matching with the corresponding profile of the magnetic element (20); in the embodiment of the drawings, the open seat (13) forms an angle of 90° which couples complementarily with the edge of the magnetic element (20); of course, the seat can have different profiles, depending on the corresponding shape of the magnetic element (20).

With reference to Figs. 3 and 4, a hinge portion (30), destined to the end side of the front part (F) of the glasses, for realizing the articulated support of the temples (10), is substantially constituted by a base (31) and by two opposite and parallel walls (32, 33) which are spaced apart so as to form a seat (36) (also called second seat in the present description), in order to accommodate the magnetic element (20), with minimal play. Said walls (32, 33) are provided with opposed and coaxial through holes (34, 35) having an isosceles or equilateral triangle shape, with corners (A, B, C) which are connected with a radius (r) of a value substantially corresponding to the radius (r) generator of the diameter of the plug (22).

In more detail and with reference to Fig.8, both triangular through holes (34, 35) have two lower connected rounded corners (A, B) that are parallel to the plane of the base (31) and arranged at a height (L2) from the same plane of the base (31), while the third rounded corner (C) constitutes the external vertex of the same triangular holes (34, 35). When the triangular holes (34, 35) have an equilateral shape, the distance (L4) of the axis connecting the corners (A, B, C) is approximately equal to twice their radius (r) of the fitting. In the case of an isosceles triangular shape, the distance (L4) between the centers of the connections (A, B) is between one and two times said radius (r).

With reference to Figs. 3, 4 and 8, the base (31) of the hinge portion (30) is provided with a circular blind seat (37) within which is fixed an additional magnetic or ferromagnetic disk (40) (also called a second magnetic element in the present description); said second magnetic

element can be fixed by means of suitable adhesive; the function of the additional disk is better specified hereinafter. Moreover, said hinge portion (30) is completed by an appendix (38) mushroom-shaped that protrudes from the base (31) and which is intended to be embedded in an appropriate position of the ends of the front part (F). More precisely, the position of embedding of the hinge portion (30) in the front (F) must ensure a shoulder (S) or an abutment of the same plate (F) having an indicative width (L5) that is at least equal to the overall width (L5) of the temple (10) with its bracket (12).

Naturally, the presence of mushroom-shaped appendix (38) is required for fixing the hinge portion (30) to a front (F) of the glasses that is realized in cellulosic acetate or other plastic material; in the case of a metallic front part, the base (31) can be welded or otherwise fixed to the end of said metal or of another type front part, according to any known technique. Similarly, also in the case of so-called three-piece glasses, the same base (31) will be provided with a plate to be fixed to the outer edges of the lenses, according to any other known technique.

As previously stated, the hole (21) of the magnetic element (20) is intended to accommodate a pin (22), having a diameter adapted to remain housed in a stable manner and with minimum interference, interference being applied only in the assembly phase of the magnetic element (20) in the seat (36) of the respective hinge portion (30). The diameter of the same pin (22) is preferably corresponding to twice the rounding radius (r) of the angles (A, B, C) of the holes (34, 35) of the hinge portion (30).

The length (L6) of the pin (22) is substantially corresponding to the width (L6) of the hinge portion (30): in this way, its ends (22a, 22b), protruding from the magnetic element (20), can be housed in the triangular holes (34, 35) of the same hinge portion (30), being able to move among the same rounded corners (A, B, C), as specified below.

Will be described the assembly and operation of the frame of the invention.

The magnetic element (20) is placed inside the seat (36) of the hinge portion (30), after the placing of the magnetic or ferromagnetic disk (40) within its seat (37), so as to facilitate the self-centering of the same magnetic element (20). The magnetic element (20) may preferably be positioned in the seat (36) when it has already been magnetically housed in the seat (13) of the angular section bar (12) which is integral with the end (11) of the temple (10), in order to make easier the same assembly operation.

With reference to Fig.4, the locking of the magnetic element (20) to the base (31) of the hinge portion (30), thanks to the presence of the disc (40), corresponds to the alignment of the beveled corner (A) of the holes (34, 35) with the axis of the hole (21) of the element (20); in

this way it is possible the forced insertion of the pin (22) in the hole (21) , until the alignment of the end (22b) of the pin (22) with the outer edge of the rounded corner (A) of the hole (35). At the same time, the opposite end (22a) of the pin (22) aligns with the outer edge of the rounded corner (A) of the other hole (34). In this way, the magnetic element (20) remains
5 engaged to the walls (32, 33) of the hinge portion (30), while being able to move and oscillate among the corners (A, B, C) of the respective holes (34, 35).

As visible in Fig.4, the temple (10) and its angular section bar (12) are associated to the magnetic element (20), possibly even after the same magnet (20) has been engaged to the portion of hinge (30), so as to be disposed in the closed position on the front (F). An identical
10 result of assembly can be achieved by arranging the temple (10) in the position of normal opening , placing the pin (20) in alignment with the rounded corners (B) of the holes (34, 35), as shown in Fig.6.

As better shown in Figs. 5 and 6, acting on the temple (10) to bring it from its closed position of Fig.4 to its open position of Fig.6, the magnetic element (20), while constrained by the plug
15 (22) to the walls (32, 33) of the hinge portion (30), can rotate freely, remaining magnetically integral with the section (12), for simple translation of the ends (22a, 22b) of its pin (22), which passes from the corners (A) to the corners (C) of the respective triangular holes (34, 35), and thereafter, passed the point of unstable equilibrium of Fig . 5 and persisting the push on the temple (10), the same magnetic element (20) continues its rotation simply by shifting
20 the ends (22a, 22b) of the pin (22) from the rounded corners (C) to the rounded corners (B) of respective triangular holes (34, 35).

With reference to fig. 6 and 7, again acting on the temple (10) in the opening direction (to the right in the figures), it is possible to achieve a good gap, to a maximum amplitude that is determined by the point of contact of the head end (11) of temple (10) against the flat surface
25 (S) inside of the front (F) or the base (31) of the hinge portion (30). In the action of wide opening, the proximal end (11) of the rod (10) works as a fulcrum to induce the ends (22a, 22b) of the plug (22) to their translation from the rounded corners (B) to the rounded corners (C) of the pair of triangular holes (34, 35) on the walls (32, 33) of the hinge portion (30).

Ceasing the action of splaying or wide opening of Fig .7, the temple (10), with a minimum
30 shooting , returns to be arranged in a position substantially orthogonal to the plane extension (S) of the front (F) , then in the condition of normal opening on the same plate (F) represented in Fig.6. This return is a result of the magnetic element (20) on the magnetic or ferromagnetic disk (40) which is rigidly fixed in the seat (37) of the hinge portion (30) and involves the translation of the end (22a, 22b) of the pin (22) from the corner (C) to the corner (B) of the

two triangular holes (34, 35).

For the closure of the temple (10) on the front (F), it is sufficient to act on the temple (10) in the opposite direction, passing from the open position of Fig.6 to the closed position of Fig.4, through the position of precarious equilibrium of Fig.5. This step corresponds to the consequent translation of the ends (22a, 22b) of the pin (22) from the rounded corners (B) to the rounded corners (A) of the triangular holes (34, 35).

According to what described and illustrated, it is evident that the placement of the magnet (20) in the seat (36) of the hinge portion (30) can be performed manually; this placement can be subsequent to the fixing of the same element (20) in the seat (13) integral with the end (11) of the temple (10), with better convenience and operational simplicity. Of course, in the associating of the magnet (20) to the section (12) of the temple (10) is necessary to place the magnet (20) so that his eccentric through-hole (21) is facing the outside of the seat (13); in other words, the orthogonal intersection of the internal walls of the section (12) must correspond to the converging distances (L1) of the same magnetic element (20).

The magnetic force of the element (20) ensures its good union to the steel section (12) and ensures the twitch movement of the temple (10) in the opening phase, in the extra opening phase and in closing phase, thank to the simple translation of its pin (22) among the rounded corners (A, B, C) of the triangular holes (34, 35) of the two shoulders or walls (32, 33) of the hinge portion (30), so allowing the easier, faster and secure union of the temples (10) at their front part (F) of the glasses, with a twitch movement of normal opening and closing, without requiring the presence of screws or hinge pins or elastic means for said movement, corresponding to the specified purposes.

It is important to note that the union of the magnetic element (20) to the section (12) can be overcome by winning its magnetic force, such as in the event of accidental impact or when the temple (10) is replaced.

The innovation until now described and illustrated , also if in an illustrative and not limitative sense, can also be realized in other forms of construction.

According to a first constructive variation, in place of the section (12), the temple (10) can be provided an one end (11) made of steel or other ferromagnetic alloy and can be joined to a transverse and orthogonal plate, even in steel or other ferromagnetic alloy, so as to form a substantially rectangular seat (13) adapted to perform the function of the seat (13) of the solution described above. A further variant is the possibility that only the end (11) or the only plate forming the cross-orthogonal angle (3) is made of steel or other ferromagnetic alloy which allows the magnetic attraction with the magnetic element (20).

As already mentioned, it is possible to form portions of the hinge (30) which are free of mushroom-shaped appendix (38) and which are provided with a base (31) that is shaped so as to be able to be welded or otherwise mechanically joined to the ends of a metallic front of the glasses, as well as the same base (31) can be shaped in order to be applied directly to the outer edges of the lenses, in a so-called three pieces glasses frame.

It is also possible to realize glasses in which the seat (13) for housing the magnetic element (20) is realized on the front (F), while a pair of shoulders or walls (32, 33), provided with the relative triangular holes (34, 35), are applied to the end (11) of the temple (10), reversing the arrangement of the parts with respect to the embodiment described above. In this way, the mount allows the same conditions of opening, closing and splaying snap of the temples (10) with respect to the front (F).

These and other similar variations, modifications or adjustments are in any case covered by the originality of the present invention to be protected.

* * *

CLAIMS

- 1 – Eyeglasses with magnetic jointed temples and location pin, for pivoting the temples at the frame end when opening, snap opening and closing, characterised by the fact of the construction of the eyeglasses requiring the joint of the frame to the temples to include a square space for the mobile positioning of a magnetic element, which magnetic element is also square and, in turn, lodged within a space comprising two walls and the base of one of the eyeglasses' two tips or frame ends, and held against such walls by the presence of a pin which, via an eccentric hole of the same magnetic item and whose emerging ends, are lodged within a pair of triangular cam-shaped or polygonal walls constructed on the walls of the tip, while the magnetic element is associated with a second magnetic or ferromagnetic element, which is fixed to the base of the eyeglass tip and aids the magnetic attraction to the squared magnetic element.
- 2 – Eyeglasses with magnetic jointed temples and location pin, as per claim 1, characterised by the fact of the construction of the eyeglasses with the tips or side ends of the frame requiring a squared space for the mobile positioning of a magnetic element, which magnetic element is also square and, in turn, lodged within a space comprising two walls and the base of one of the eyeglasses' two temple ends and held against such walls by the presence of a pin which via an eccentric hole in it, the ends of the pin can be lodged within a pair of triangular cam-shaped or polygonal walls which are constructed on such walls.
- 3 – Eyeglasses with magnetic jointed temples and location pin, as per claim 1, characterised by the fact that the temple (10) end (11) is fixed to a transversal element of angular sheet (12) steel or other ferromagnetic alloy, preferably of equal sides, which is intended to provide a rectangular internal space (13).
- 4 – Eyeglasses with magnetic jointed temples and location pin, as per claims 1 and 3, characterised by the fact that an approximately cubic element (20) is constructed in a magnetic material with side (L) corresponding to side (L) of the space (13) on the temple (10) and has a transversal hole (21), which opening (21) is constructed eccentrically, with distances (L1) which are approximately 6/10 (L) and with distances (L2) which are approximately 4/10 of (L).
- 5 – Eyeglasses with magnetic jointed temples, as per claim 4, characterised by the fact that the eccentric hole (21) of the magnetic element (20) is intended to house the pin (22) which is intended to be associated with the said magnetic element (20), with minimal interference, only during the assembly of the temple (10) to the tip (30), said pin (22) having a length (L6)

which is substantially equal to the distance (L6) between the external surfaces of the walls (32-33) of the tip (30).

- 5 6 – Eyeglasses with magnetic jointed temples, as per claims 4 and 5, characterised by the fact that a tip or lateral end (30) of the eyeglasses frame (F), for supporting the temples (10), substantially comprises a base (31) and two opposing and parallel walls (32-33) which have a distance between them which forms a space (36), for housing, with minimum play, the magnetic element (20), said walls (32-33) have opposing and coaxial holes (34-35) in the form of equilateral or isosceles triangles, with angles (A-B-C) which are connected with a radius (r) which substantially corresponds to a radius (r) of the diameter of the pin (22).
- 10 7 – Eyeglasses with magnetic jointed temples, as per claim 6, characterised by the fact that both the triangular holes (34-35) present two internal connected angles (A and B) which are parallel to the plane of the base (31) and have height (L2) from the same plane (31), while the third connected angle (C) forms the external apex of the same triangular holes (34-35) said internal angles (A-B) have a distance (L4) which is approximately equal to twice the radius (r)
- 15 connecting them.
- 8 – Eyeglasses with magnetic jointed temples and with location pin, as per claims 1 and from 3 to 7, characterised by the fact that the base (31) of the tip (30) has a circular space (37) within which an additional magnetic or ferromagnetic disc (40) is fixed, acting to centre the magnetic element (20) in the space (36) of the tip (30).
- 20 9 – Eyeglasses with magnetic jointed temples and with location pin, as per claims 1 to 8, characterised by the fact that the base (31) of the tip (30) is coplanar and has a shoulder (S) of the frame (F) with an approximate width (L5) which is the least equal to the total width (L5) of the temple (10) with its bracket (12).

* * *

Fig. 1

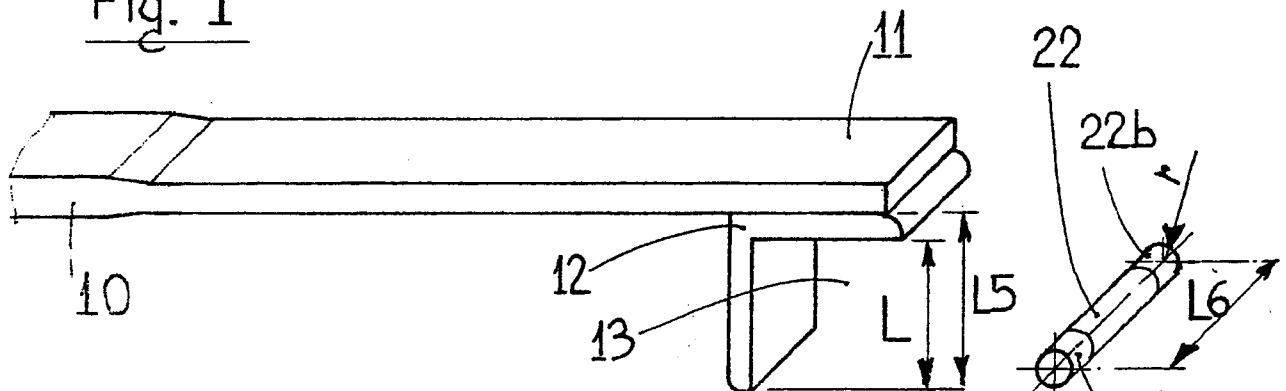


Fig. 2

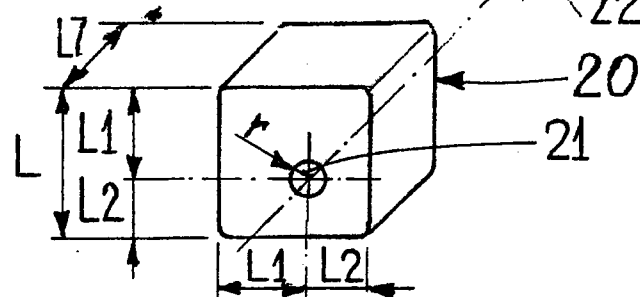


Fig. 3

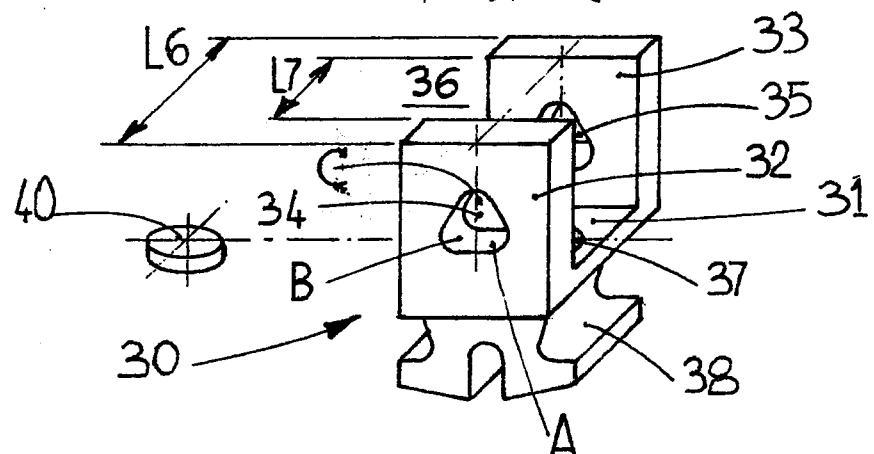
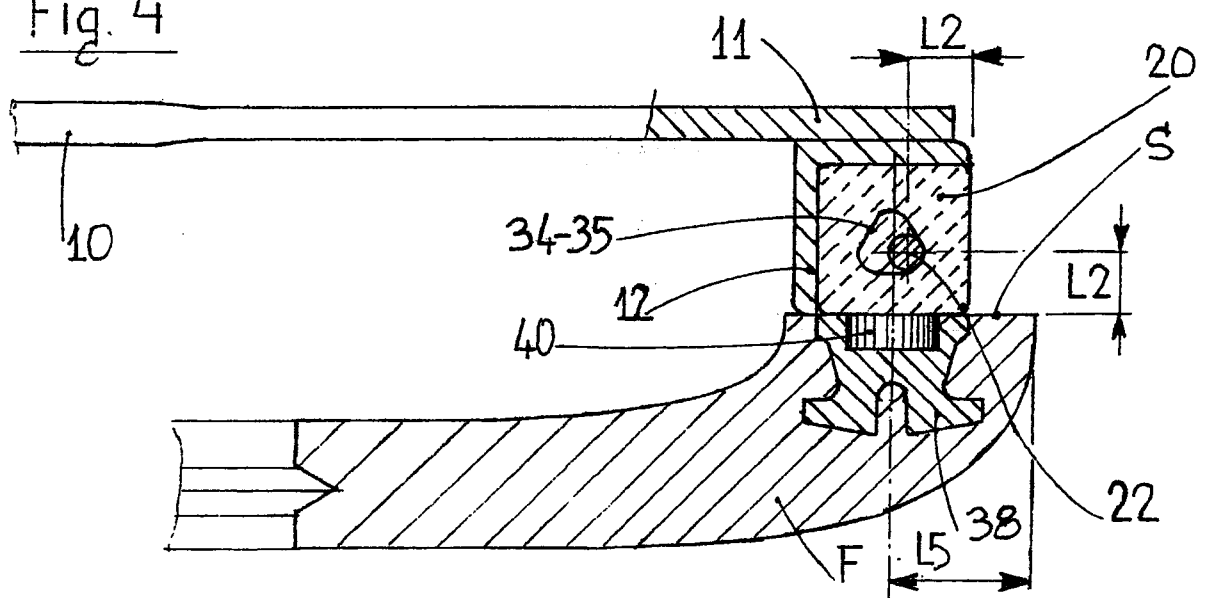


Fig. 4



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Fig. 5

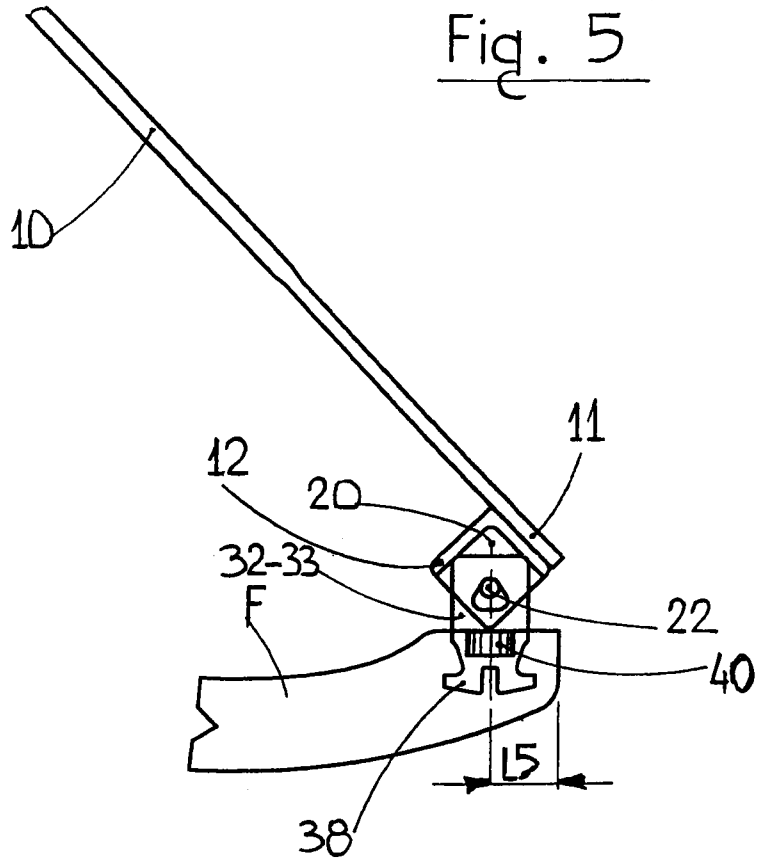


Fig. 6

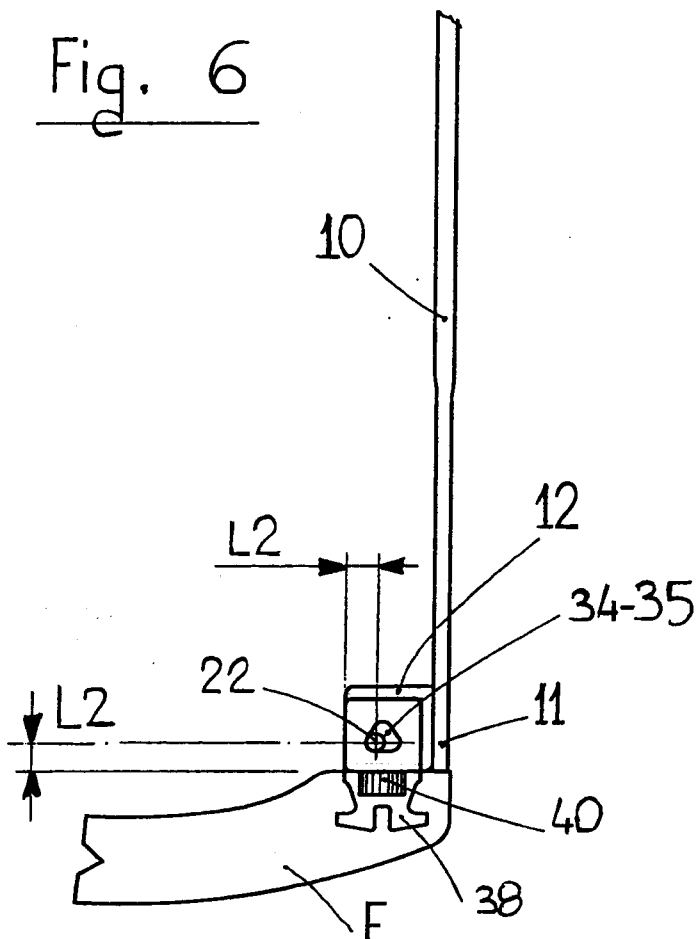


Fig. 7

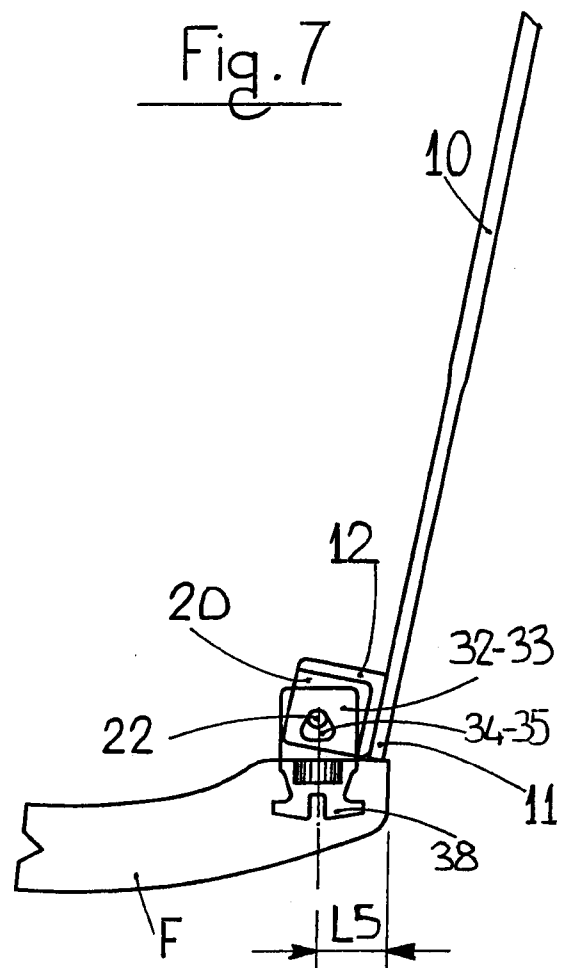
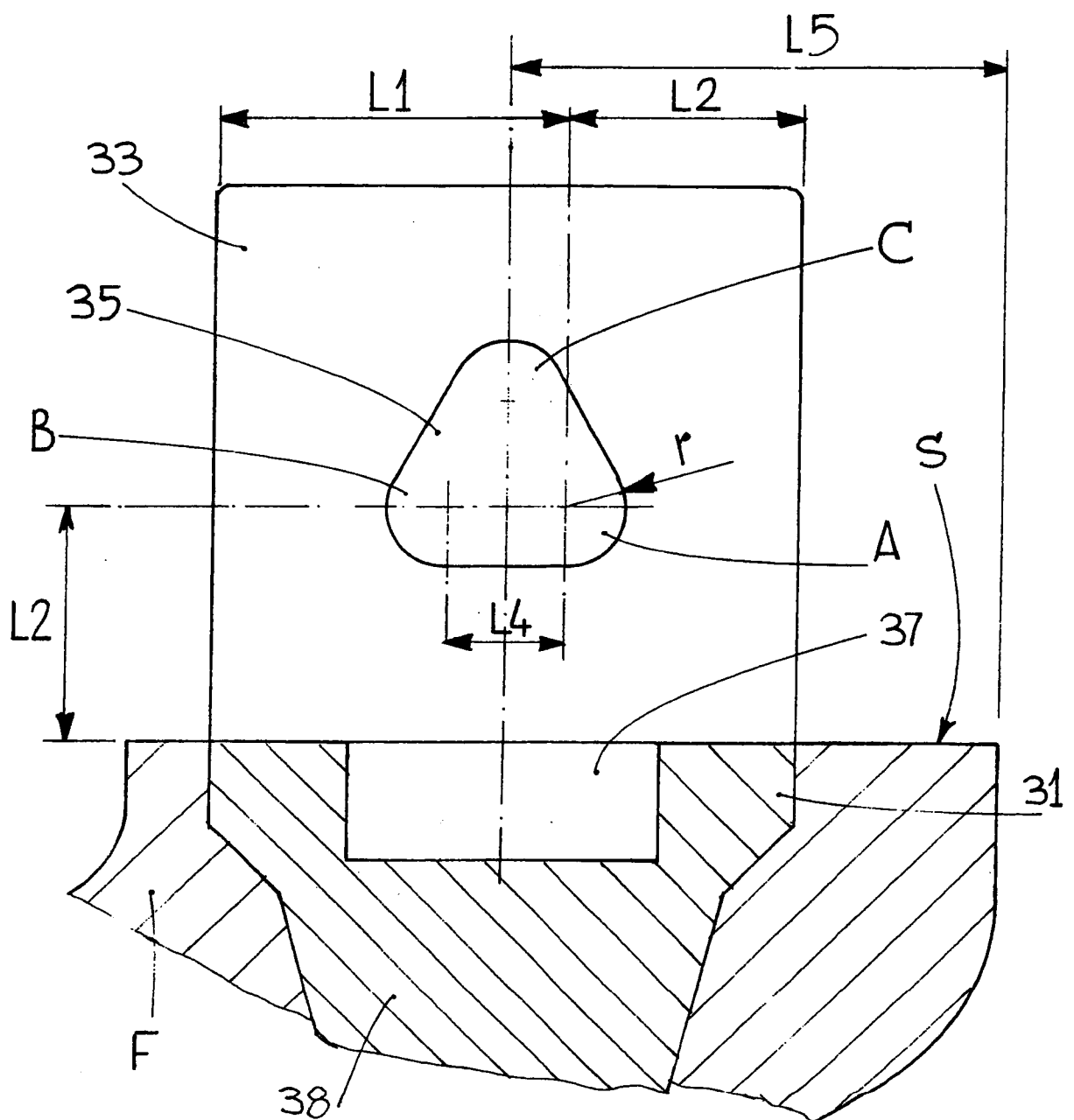


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No

PCT/IT2014/000016

A. CLASSIFICATION OF SUBJECT MATTER

INV. G02C5/22 G02C5/14
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G02C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 658 231 A1 (PIARD GERARD [FR]) 16 August 1991 (1991-08-16) figures 1-9	1-9
A	US 5 631 719 A (CHAO DAVID Y [US]) 20 May 1997 (1997-05-20) column 2, line 1 - line 47; figures 6-8	1-9
A	CA 2 321 318 A1 (SUNATORI GO SIMON [CA]) 2 April 2002 (2002-04-02) cited in the application abstract; figures 2-5	1-9
A	US 5 579 062 A (SONDROL LARRY L [US]) 26 November 1996 (1996-11-26) abstract; figures 2, 3, 8-11	1-9
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Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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Date of the actual completion of the international search

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2004 109841 A (SANRIIBU KK) 8 April 2004 (2004-04-08) paragraphs [0015] - [0018]; figures 42-44 -----	1-9
A	US 2007/132942 A1 (ZELAZOWSKI DENNIS [US]) 14 June 2007 (2007-06-14) abstract; figures 1-31 -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2658231	A1	16-08-1991	NONE
US 5631719	A	20-05-1997	NONE
CA 2321318	A1	02-04-2002	NONE
US 5579062	A	26-11-1996	AU 5923196 A 11-12-1996 EP 0827597 A1 11-03-1998 US 5579062 A 26-11-1996 WO 9637802 A1 28-11-1996
JP 2004109841	A	08-04-2004	NONE
US 2007132942	A1	14-06-2007	CA 2632748 A1 21-06-2007 EP 1969418 A1 17-09-2008 US 2007132942 A1 14-06-2007 WO 2007070829 A1 21-06-2007