

Fixing assemblage for fixing additional lenses, binocular loupes and the like with spectacles

The present invention relates to a fixing assembly, capable of fitting spectacles with supplemental lenses which serve as filters, protective shields and/or magnifying glasses over a restricted sub-area of the actual lenses. The fixing assembly includes mechanical holders which enable the positioning, aligning and/or maintaining the alignment of supplemental lenses.

For example, the dentists have a need to wear a protective shield for blocking the radiation of a UV-curing device from striking directly on the eyes. A separate UV-protection shield held by a dental assistant is inconvenient to use. In addition to UV-radiation, the protection can be applied to any ophtalmologically harmful radiation. In addition, the separate lenses may also serve as filters for making certain objects more clearly detectable.

On the other hand, it is often desirable that the spectacles be provided with a magnifying sub-area that can be used in precision work which requires magnification from time to time. Manufacturing special bifocal glasses for this purpose is expensive.

A fixing assembly of the invention can also be used for fitting the spectacles with binocular loupes, comprising an attachment frame and two loupes, each provided with at least two lenses of which the ocular lens closer to the eye is smaller than the outer objective lens.

Such binocular loupes to be attached to spectacles are intended to facilitate precision work, such as the work of a dentist or of a precision mechanician. The drawbacks of prior art binocular loupes include a complicated design and an

excessive weight as well as a restricted field of vision caused by the loupes.

US Patent publication 5,182,588 anticipates the attachment
5 of a protective coating to the surface of spectacle lenses
over a restricted sub-area of the lens. A thin surface
coating is difficult to manufacture and it alters the spec-
tacles permanently and, thus, the solution is poorly adapt-
able to spectacles adjusted to each individual's own eyes.
10 Furthermore, the coating formed by a thin layer is difficult
to provide with a sufficient protective effect if clear
transparency is desired at the same time. The coating only
offers protection and does not provide a possibility of
using simultaneously or alternatively a magnifying glass or
15 a binocular loupe.

Moreover, e.g. Patent publications US-4,647,165 and US-
3,446,548 disclose the placement of various supplemental
lenses over a sub-area of the actual lenses by means of
20 mechanical, adjustable arms. These prior art solutions do
not afford a reliable attachment for supplemental lenses and
the attachment arrangement is not suitable for all types of
spectacles. The attachment is often secured by manufacturing
specially designed spectacles, leading to a substantial
25 increase in total costs. The most general drawback in prior
art attachment units based on mechanical attachment arms is
the fact that the attachment assemblies obscure and inter-
fere with the field of vision.

30 An object of the invention is to provide a fixing assembly
for attachments mountable on the user's own spectacles, said
assembly being as inconspicuous, easy to use and economical-
ly priced as possible and versatile in applying it to fixing
various attachments. In the attachment of binocular loupes,
35 for example, it is important that the fixing assembly and
the loupes screen as little as possible of the field of
vision, whereby the view can be readily directed past the

loupes at the same target that has just been examined and magnified through the loupes.

5 A particular object of the invention is to provide a fixing assembly for supplemental lenses and/or binocular loupes, which is suitable for use in connection with many different types of spectacles.

10 These objects are achieved on the basis of the characterizing features set forth in the annexed claim 1. Preferred embodiments of the invention are set forth in claims 2-8.

15 For example, the use of resiliently flexible arms (claim 2) offers substantial benefits if compared to rigid hinged frames. The lenses carried by flexible arms are readily cleanable and return to the original position thereof.

20 The non-independent claims 9-13 disclose preferred embodiments of the invention assisting in the individual focusing of loupes for setting the loupes precisely according to the ocular gap of a user and for minimal screening of the field of vision caused thereby.

25 The invention will now be described in more detail with reference made to the accompanying drawings, in which

30 fig. 1 is a frontal view of a fixing assembly of the invention for attaching supplemental lenses to spectacles;

fig. 2 shows in a larger scale the attachment between a supplemental lens and its holding arm;

35 fig. 3 is a larger-scale side view of a supplemental lens attachment clip and the setting of a supplemental lens 4 relative to a spectacle lens. The figure

also depicts the attachment of a separate magnifying glass 16 by means of the same metal clip;

5 fig. 4 is a plan view of a metal clip included in the fixing assembly of fig. 3;

fig. 5 is a section along a line V-V in fig. 4;

10 fig. 6 is a section along a line VI-VI in fig. 4;

fig. 7 is a plan view of a fixing assembly of the invention for attaching loupes to spectacles;

15 fig. 8 is a frontal view of the binocular loupes shown in fig. 7;

fig. 9 is a side view of the same binocular loupes; and

20 fig. 10 is a more detailed view of loupe attachment arms with their hinges and adjustment facilities.

The fixing assembly for attaching supplemental lenses will be first described with reference made to figs. 1-6.

25 Supplemental lenses 4 protecting from opthalmologically harmful radiation and/or serving as magnifying glasses and/or as filters are positioned on the inside surface of actual lenses 1 adjacent to the bottom edge of the lenses 1. Attachment of the supplemental lenses 4 is effected by means
30 of resiliently flexible arms 5, comprising e.g. steel wire. The bottom ends of said arms 5 are fixed by means of an adhesive in a slot made in the bottom edge of the supplemental lenses 4. The top ends of said arms 5 are secured to a metal clip 6 that can be tightened with a screw 7. The metal
35 clip 6 is in engagement with a bridge 3 connecting rims or eyewires 2 of the actual lenses across the nose.

The metal clip 6 includes two body members 8, 9 for clamping the ends of the arms 5 therebetween by tightening the screw 7. A clamping hook 10 made of a flexible, soft metal, e.g. silver provides a gripping yoke around the bridge 3. The ends of said clamping hook 10 are received in a hole 11a, 11b, extending through the body members 9, 8 and dimensioned relative to the screw 7 such that the screw threads engage with the material of the clamping hook 10. The clamping hook 10 can be provided with existing threads or those may be a result of cutting by the screw. Such a clip assembly makes it possible that a single screw 7 be used for clamping the clip securely to the bridge 3 and at the same time for pressing the arms 5 into the engagement with the clip. The surface of said clip body member 8, facing the other body member 9, is provided with grooves 12 less deep than diameter of the arms 5 for receiving said arms 5. Thus, the arms 5 retain the alignment thereof and, prior to final tightening of the screw 7, the length of the arms 5 can be regulated by a longitudinal adjustment thereof between the body members 8, 9 for placing the supplemental lens 4 in a proper position. Finally, the extra length from the top ends of the arms 5 can be cut off. If the arms cannot be fixed from below, it can be done from above by bending down the arms extending from the top edge of the clips.

In addition, the body member 8 of the clip 6 is designed for an engagement with a yoke-like holder 14 mounted on the base of an arm 15 supporting a separate magnifying and/or protective glass 16. The yoke-like holder 14 is pressed from above on top of the body member 8 with ribs included in the inner surfaces of the yoke 4 engaging grooves 13. This type of magnifying glass 16 in association with spectacles is prior known but, according to the invention, it is attached in a new fashion by means of a lightweight holder yoke 14 to a metal clip 6 of the invention.

Fig. 2 shows in more detail the possibility that the bottom half of a supplemental lens 4 comprises a protective glass 4b and the top half a magnifying glass 4a. In this case, a separate magnifying glass 16 is not needed. Alternatively,
5 either one of the magnifying glasses 4a or 16 can be a filter or a combination of a filter and a magnifying glass.

The following description deals with the exemplary embodiment shown in figs. 7-10.

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Binocular loupes 18 are fastened by means of a bracket 17 to a nose bridge 3 included in spectacles. Each loupe 18 is fitted with at least two lenses of which the ocular lens closer to the eye is smaller than the outer objective lens.
15 As for its outer surface, a loupe jacket 19 connecting the lenses also diverges at a sector angle which is essentially consistent with that drawn from the pupil to the rim of the ocular lens. Thus, restriction of the field of vision caused by the loupes is minimal. The user is able to look through
20 or past the loupes according to his or her choice by just slightly turning the viewing direction and the head.

The loupe jackets 19 may consist of tubes having a thin wall thickness and a conicity which is consistent with said
25 sector angle. The loupe jacket material may be a metal, fiber-reinforced plastics etc. The loupe jacket may have a cross-section which is circular, elliptical or polygonal.

The loupes 18 are mounted on flat crossarms 20 which can be
30 bent at hinge points 21 that are made of a metal and have a shape which changes as a result of bending. The hinge points 21 can be made of a material other than the arms 20, e.g. wire threads embedded in the arm material which is e.g. light metal or fiber-reinforced plastics. The axial direc-
35 tions of hinges 21 are selected so as to control bending of the arms 20 such that, in various positions of the loupes 18, the centre axes thereof cross each other at essentially

the same distance from the binocular loupes 18. Thus, the loupes always remain on focus provided that the distance between the loupes is set according to the distance between the eyes.

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At the mid-point thereof between the hinges 21, said crossarms 20 are connected to a lengthwise arm 24 whose attachment point is also provided with a hinge 22 made of a resilient metal. The arm element 24 is provided with a
10 lengthwise slot 28 and the arm element 26 with a crosswise slot 27 and, thus, attachment of the arm elements 26 and 24 to each other by means of a screw 25 affords both a lengthwise and crosswise adjustment. The arm element 26 is connected with a hinge 23 to a yoke-like clip 6a which is
15 mountable from above (or from below) on a metal attachment body 6b, having its sides provided with grooves 6c and the inner surfaces of the yoke 6a being shaped accordingly. In this case, the members 6a and 6b together provide an attachment clip, generally designated by reference numeral 6. With
20 this snap-fit coupling, the binocular loupes are readily removable and replaceable. The small-sized and inconspicuous attachment body 6b can be permanently fixed to the nose bridge 3 of spectacles. The attachment body 6b can be fixed to nearly all types of spectacles by using a clamping hook
25 10, made of a soft metal and constituting a loop which grips around the nose bridge 3 and whose ends are received in a hole extending through the attachment body 6b and dimensioned identically to the hole in the member 8 in fig. 6, i.e. in such a manner that the threads of a screw 7
30 engage with those of the clamping hook 10. Such a clip is small, inconspicuous and firm and adaptable to nearly all types of spectacles.

What is essential about the invention is that the fixing
35 assembly and the loupes are lightweight and only obscure a small section of the field of vision. This objective can be favoured even further by designing a thin-walled loupe

jacket so as to comply with the sector angle of a field of vision covered by a small-sized ocular lens. In addition, the flat shape and positioning of attachment arms are selected so as to interfere minimally with the field of vision. At the same time, however, the attachment arms, with the aid of their hinge points, enable an individual alignment and setting of the distance between the eyes, such that the loupes have a focus always fixed in position. The loupes may have a length of e.g. 20 - 30 mm. The ocular lens may have a diameter of e.g. about 10 mm. The ocular lens' distance from the eye is in the order of 20 mm when the lens is positioned very close to the lens of spectacles. The objective has a diameter which is determined by the sector angle and the length of the loupes.



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Claims

1. A fixing assembly for attaching supplemental lenses (4),
binocular loupes (18) and like attachments to spectacles,
5 c h a r a c t e r i z e d in that the fixing assembly com-
prises a clip (6) which is tightenable by means of a screw
(7) into the engagement with a bridge (3) connecting the
rims of the actual lenses across the nose, that the clip (6)
comprises a clamping hook (10) constituting a loop which
10 grips around said bridge (3) and whose ends are received in
a hole (11a, 11b) extending through a clip body (8, 9; 6b)
and dimensioned relative to the screw (7) such that threads
of the screw (7) engage with the clamping hook (10), and
that attachments (4; 18) are secured by way of thin arms (5;
15 20-26) to said clip (6).

2. An assembly as set forth in claim 1 for attaching supple-
mental lenses, c h a r a c t e r i z e d in that said arms
(5) are flexibly resilient.

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3. An assembly as set forth in claim 2, c h a r a c -
t e r i z e d in that the bottom ends of the arms (5) are
attached to the edge of a supplemental lens (4) and the top
ends of the arms (5) are attached to said clip (6).

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4. An assembly as set forth in claim 1, 2 or 3, c h a r -
a c t e r i z e d in that the clip (6) is made of metal.

5. An assembly as set forth in any of claims 2-4,
30 c h a r a c t e r i z e d in that the clip (6) comprises a
two-membered clip body (8, 9), the ends of said arms (5)
being clampable between said members.

6. An assembly as set forth in claim 5, c h a r a c -
35 t e r i z e d in that at least that surface of one body
member (8), which lies opposite to the other body member

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(9), is provided with grooves (12) less deep than the diameter of the arms (5) for receiving said arms (5).

7. An assembly as set forth in any of claims 1-6,
5 c h a r a c t e r i z e d in that the clip body (6, 8) is designed for an engagement with a yoke-like holder (14) mounted on the base of an arm (15) supporting a separate magnifying and/or protective glass.

10 8. An assembly as set forth in any of claims 1-7, c h a r a c t e r i z e d in that the supplemental lenses (4) are placed on the inside of actual lenses (1) adjacent to the bottom rim of the lenses (1).

15 9. An assembly as set forth in claim 1 for attaching binocular loupes (18) to spectacles, the binocular loupes comprising two loupes (18), each including at least two lenses of which the ocular lens closer to the eye is smaller than the outer objective lens, c h a r a c t e r i z e d in that the
20 outer surface of a loupe jacket (19) connecting the lenses also diverges at a sector angle which is essentially consistent with that drawn from the pupil to the rim of the ocular lens and that the attachment arms (20-26) of the loupes (18)
25 are flat in the direction transverse to the viewing direction so as not to create any substantial obstruction of the field of vision.

10. An assembly as set forth in claim 9, wherein the loupe jackets (19) are thin in wall thickness and have a conicity
30 consistent with said sector angle, c h a r a c t e r i z e d in that the loupes (18) are attached to crossarms (20) that can be folded at hinge points (21) made of a metal deformable upon bending.

35 11. A fixing assembly as set forth in claim 10, c h a r a c t e r i z e d in that the hinge points (21) control the folding of said arms (20) such that in various positions of





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the loupes (18) the centre axes thereof cross each other at the substantially same distance from the binocular loupes (18).

- 5 12. A fixing assembly as set forth in claim 10 or 11, characterized in that the crossarms (20) are connected at the junction thereof to a central lengthwise arm (24, 26) which is also provided with a folding hinge (22, 23) and a lengthwise adjustment (28, 25).

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13. A fixing assembly as set forth in claim 9 or 12, characterized in that the free end of the attachment arm (26) carries a yoke-like clip member (6a) which provides a snap fit for said attachment body (6b) which is
15 included in the nose bridge (3) of a spectacle frame.

14. A fixing assembly for attaching supplemental lenses (4), binocular loupes (18) and like attachments to spectacles, characterized in that the fixing assembly in-
20 cludes a clip body (8, 9; 6b) which is attached to a bridge (3) connecting the rims of actual lenses across the nose by means of a clamping hook (10) gripping around said bridge and that attachments (16; 18) are secured to the clip body (8, 9; 6b) by means of an attachment arm (15; 24, 26), whose
25 free end carries a yoke-like holder element (14; 6a) which provides a snap fit for said clip body (8, 9; 6a).

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