

PATENT SPECIFICATION

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(54) SPECTACLES

(71) We, MARWITZ & HAUSER, a Kommanditgesellschaft organised under the laws of the Federal Republic of Germany, of 5 Dornhaldenstrasse, Stuttgart, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

10 The invention concerns safety spectacles with two eye rims having lens grooves on their inside, these rims being connected by a one-piece bridge, with fixed hinge mounting points being provided on the outside at the back of the eye rims, with nose pads being provided on the inside at the back of the eye rims, and with two side arms which are hinged to the aforementioned hinge mounting points.

20 These spectacles are not to be compared with those used for protecting the eyes during grinding or welding. However, they are of the kind which can be provided with corrective lenses and which can be worn instead of normal spectacles. Such safety spectacles are e.g. required in the engine room of sea-going vessels, during sailing, parachute-jumping, ballooning, in caves and coal mines, when riding tanks etc.

30 Safety spectacles have already been suggested for similar uses and have so far enjoyed only limited success. Such spectacles may be too flexible so that the lenses come out of their mounting, or too massive because of attempts to compensate for the missing rigidity by increasing the material mass. Owing to their design differing so much from the common type of spectacles some safety spectacles were considered by

40 their wearers as being unaesthetic. Perhaps the rims had been designed too thick. This is not only disadvantageous from an aesthetic point of view. There is an increased possibility of catching these spectacles on something.

45 And the field of view beyond the rim is then

obscured. But even the non-focus area on the edges of the field of view contributes to a general orientation.

The following features are desirable in safety spectacles:-

a) The spectacles must be able to absorb shocks without losing their shape to a great extent.

b) The lenses must be held by the frame in an elastic, soft but nevertheless secure 55 manner.

c) It should be possible to produce them cheaply.

d) It should be possible to design the spectacles aesthetically appealing or even to 60 create a fashion trend which would be advantageous to the use of the safety spectacles.

e) The spectacles must be wearable all day, i.e. in warm, cold and damp conditions.

f) If it is desired to avoid disturbing 65 reflections, the spectacles must have a matt finish.

g) When not in use, the spectacles should be storable in the normal way, i.e. in cases etc. 70

h) The eye rims must not be too thick in order to be able to use as large lenses as possible so that a large field of view is obtained.

i) Under difficult conditions, the fit of 75 the spectacles must be such that they have as little movement relative to the head as possible.

j) The spectacles should, in other respects also, be of a design in line with the 80 conventional spectacles.

Thus, in accordance with the invention, there is provided safety spectacles with two eye rims on the inside of which lens grooves are provided, with a one-piece bridge connecting the eye rims, with fixed hinge mounting points being provided on the outside at the back of the eye rims, with nose pads being provided on the inside at the back of the eye rims, and with two side arms which are 90

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hinged to the above mentioned hinge mounting points, characterised in that:

- a) an inner frame of a relatively hard elastic material, extends in one piece from one hinge mounting point to the other, through the upper parts of the eye rims and the bridge;
- b) the base plates of the hinge mounting points are embedded in the inner frame;
- 10 c) the inner frame, which does not emerge anywhere, is embedded in a homogeneous fine-closed cell polyurethane foam which covers the inner frame and is relatively soft and elastic; and
- 15 d) the nose pads and the lens grooves are formed by the polyurethane foam.

In a layer of a few millimetres, this polyurethane foam has sufficient elastic properties. It is close-celled and the spectacles do, therefore, not become heavier in humid conditions. It is easy to mold so that it does not require complicated manufacturing processes. It also follows delicate die shapes. It is harmless to skin, resistant to aging and resistant to perspiration so that wearing the spectacles does not result in any discolouration. It does not embrittle under cold conditions and does not get too soft in warmth. It insulates well so that e.g. under very cold conditions there is no freezing as is the case where the bridge is formed of a heat conducting material. It can be given a high coefficient of friction so that the spectacles are held firmly on the nose without pinching.

25 The insertion of corrective lenses does not present any difficulties. Although the lenses are held well, they do not crack as easily due to the comparatively soft mounting. This type of spectacle design is even interesting from the fashion point of view.

A matt finish may be employed to result in the spectacles not producing any reflections at night. A matt-finish outer surface increases the frictional connection between nose and spectacles and results in more pleasant wearing characteristics. Die molds need not be highly polished. Because of the matt surface which shows increased frictional properties, the spectacles slide off less frequently from vibrating tables etc.

A preferred embodiment is characterised by the inner frame also extending from the hinge mounting points through the lower rims of the eye rims and the bridge, but wherein the portion of the inner frame which extends through the upper rims is not in one piece with the portion of the inner frame which extends through the lower rims within the bridge. This results in a splendid combination being achieved of the two basically contradicting properties, i.e. softness on one hand and rigidity on the other hand combined with a slim design.

A metal wire may be embedded in the inner frame, the latter being formed from an

injection-molded plastic. The spectacles will still fit if the inner frame has suffered a crack following a particularly high strain. However, this feature also enables a smaller cross-section of the inner frame to be selected so that one obtains slimmer spectacles with an unchanged polyurethane layer thickness, or one can provide a thicker polyurethane foam layer if the spectacles are not of an excessively massive appearance. This basically applies to designs where the inner frame consists largely of plastic.

The side arms may have a metal core surrounded by a polyurethane foam, preferably only adjacent the temple area, the metal core being surrounded by hard plastic in the ear area. Thus a soft support is provided and the frictional connection is increased in the temple area if the spectacles are subjected to lateral strain, but the ear area can be adjusted by bending and made rigid over a large area in order to obtain a good ear fit.

A hole is preferably provided in the ear area for a safety ribbon, to prevent the safety spectacles being lost if they fall off the wearer's nose, whereby in contrast to the commonly used cords a wide ribbon may be used which cuts in less and which cannot be slipped off over the ear part of the side pieces.

In a preferred embodiment, the hard elastic material is a metal strip. The invention is now described by way of preferred embodiments. The figures represent the following:-

Figure 1 the partly sectional front view of the eye rims together with the bridge of safety spectacles in accordance with the invention;

Figure 2 a section along line 2-2 in Figure 1;

Figure 3 a section similar to Figure 2, but through a second exemplified embodiment;

Figure 4 a section similar to Figure 2, but through a third exemplified embodiment;

Figure 5 a section similar to Figure 2, but through a fourth exemplified embodiment; and

Figure 6 the partly opened external view of a side arm in accordance with the invention.

The two eye rims 11 and 12 are provided with lugs 13, 14 on their outsides and are joined by a bridge 16. Each eye rim 11, 12 has an upper rim 17, 18 a lower rim 19, 21 and a nose rim 22, 23, sloping upwards.

Figure 1 clearly shows the outer contours, and one can see from this representation that the spectacles are of a common, aesthetic, wearable design.

An inner frame 24 which is shown partly dotted and partly solid, extends from the lug 13 through the upper rim 17, the upper area of bridge 16, the upper rim 18 and the lug 14. In the area of lugs 13, 14, the inner frame 24 shows widenings 26, 27 into which the base plates 28, 29 of hinges are embedded and

which project at the back in the normal manner. The inner frame 24 conveniently consists of a hard plastic material as commonly used for spectacles. However, its surface has been left rough. A groove 31 is provided on the inner edge of the inner frame 24 as far as this extends along the upper frame 17, 18.

The externally visible shape consists of polyurethane foam 32 which surrounds the inner frame 24 completely and exclusively forms the frame in the area of the lower rim 19, 21 and the nose rim 22, 23. The pads - not illustrated - provided on the back of the nose rim 22, 23 also consist of this polyurethane foam 32. Along the inner edges the polyurethane foam is provided with lens grooves 33 so that lenses (which may, if desired, be corrective) may be inserted. In contrast to commonly known spectacles, the eye rims 11, 12 need not be warmed prior to insertion.

Figure 3 illustrates a metal wire 34 embedded in the inner frame 24.

Figure 4 shows that the inner frame 24 may extend through the complete frame. This is illustrated by the dotted line 36 in Figure 1. It should, however, be noted that in the bridge 16 the two paths of the inner frame 24 are not connected with each other so that there is no massive hard plastic body provided inside.

Figure 5 finally shows that a metal wire 37 may be passed through such a continuous inner frame 24.

A metal core 39 preferably runs in the inside of the side pieces 38, this core being provided on the r.h. end with a hinge mount 41 of common design which fits on the hinge secured to end pieces 13, 14. In the temple area, this metal core 39 is surrounded by a polyurethane foam 43, and one can see from this illustration that pleasant and commonly known designs do not have to be deviated from. The ear area of the metal core 39 is surrounded by hard and smooth plastic 46 which is widened at the end 47, this widening being larger than usual and showing an oblong hole 48.

The inner frame 24 must have a sufficiently elastic resiliency. Metal structures forming the inner frame or contained in it must, therefore, not consist of lead, aluminium, copper or similar materials which show little resiliency with the dimensions possible here.

WHAT WE CLAIM IS:-

1. Safety spectacles with two eye rims on the inside of which lens grooves are provided, with a one-piece bridge connecting the eye rims, with fixed hinge mounting points being provided on the outside at the back of the eye rims, with nose pads being provided on the inside at the back of the eye rims, and

with two side arms which are hinged to the above mentioned hinge mounting points, characterized in that:

a) an inner frame of a relatively hard elastic material, extends in one piece from one hinge mounting point to the other, through the upper parts of the eye rims and the bridge;

b) the base plates of the hinge mounting points are embedded in the inner frame;

c) the inner frame, which does not emerge anywhere, is embedded in a homogeneous fine-closed cell polyurethane foam which covers the inner frame and is relatively soft and elastic; and

d) the nose pads and the lens grooves are formed by the polyurethane foam.

2. Safety spectacles according to Claim 1, characterised by the polyurethane foam having a matt exterior surface.

3. Safety spectacles according to Claim 1, characterised by the inner frame also extending from the hinge mounting points through the lower rims of the eye rims and the bridge, but wherein the portion of the inner frame which extends through the upper rims is not in one piece with the portion of the inner frame which extends through the lower rims within the bridge.

4. Safety spectacles according to Claim 1, characterised by a metal wire being embedded in the inner frame, the latter being formed from injection-molded plastic.

5. Safety spectacles according to Claim 1, characterised by the side arms having a metal core surrounded by polyurethane foam.

6. Safety spectacles according to Claims 1 and 5, characterised by the metal core of the side arms being surrounded by polyurethane foam only adjacent the temple area and being surrounded by hard plastic in the ear area.

7. Safety spectacles according to Claim 6, characterised by a hole being provided in the ear area.

8. Safety spectacles according to Claim 1, characterised by the hard elastic material being a metal strip.

9. Safety spectacles according to Claim 1, characterised by the inner frame consisting solely of injection-molded plastic.

10. Spectacles, substantially as described herein with reference to and as illustrated by Figure 1 and any one of Figures 2 to 6 of the accompanying drawing.

11. Safety spectacles as claimed in Claim 1, substantially as hereinbefore described.

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which project at the back in the normal manner. The inner frame 24 conveniently consists of a hard plastic material as commonly used for spectacles. However, its surface has been left rough. A groove 31 is provided on the inner edge of the inner frame 24 as far as this extends along the upper frame 17, 18.

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4. Safety spectacles according to Claim 1, characterised by a metal wire being embedded in the inner frame, the latter being formed from injection-molded plastic.

5. Safety spectacles according to Claim 1, characterised by the side arms having a metal core surrounded by polyurethane foam.

6. Safety spectacles according to Claims 1 and 5, characterised by the metal core of the side arms being surrounded by polyurethane foam only adjacent the temple area and being surrounded by hard plastic in the ear area.

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