

April, 1937

## SECTION XII

## CHAPTER 1

## SPECTACLES, MK. V, MK. VA and MK. VA\*

## General

1. The spectacles described in this chapter are for the use of observers, gunners and in some instances pilots for the purpose of protecting their eyes from glare. The spectacles can be worn attached to the flying helmet, or without the helmet and retained in position by a head strap. The protection provided includes side windows and a sun vizor, the latter being readily adjustable to suit the varying conditions of flight. Spare windows are provided and are interchangeable to suit different flight conditions including various intensities of light. The MK. VA\* spectacles have polaroid windows which absorb specular reflection from the surface of water; these are required chiefly in submarine detection.

2. Although primarily for use in enclosed aeroplanes, the spectacles will resist a moderate wind. They are held to the helmet in a manner which allows them to be pushed up and held on the forehead by a catch-hook or hooks when not in use. When used without the helmet, simply pushing them up on to the forehead suffices, though it is probably simpler to remove them altogether. The spectacles are more comfortable and more efficient when worn with a helmet. All the windows, side shields and the vizor are shatter proof.

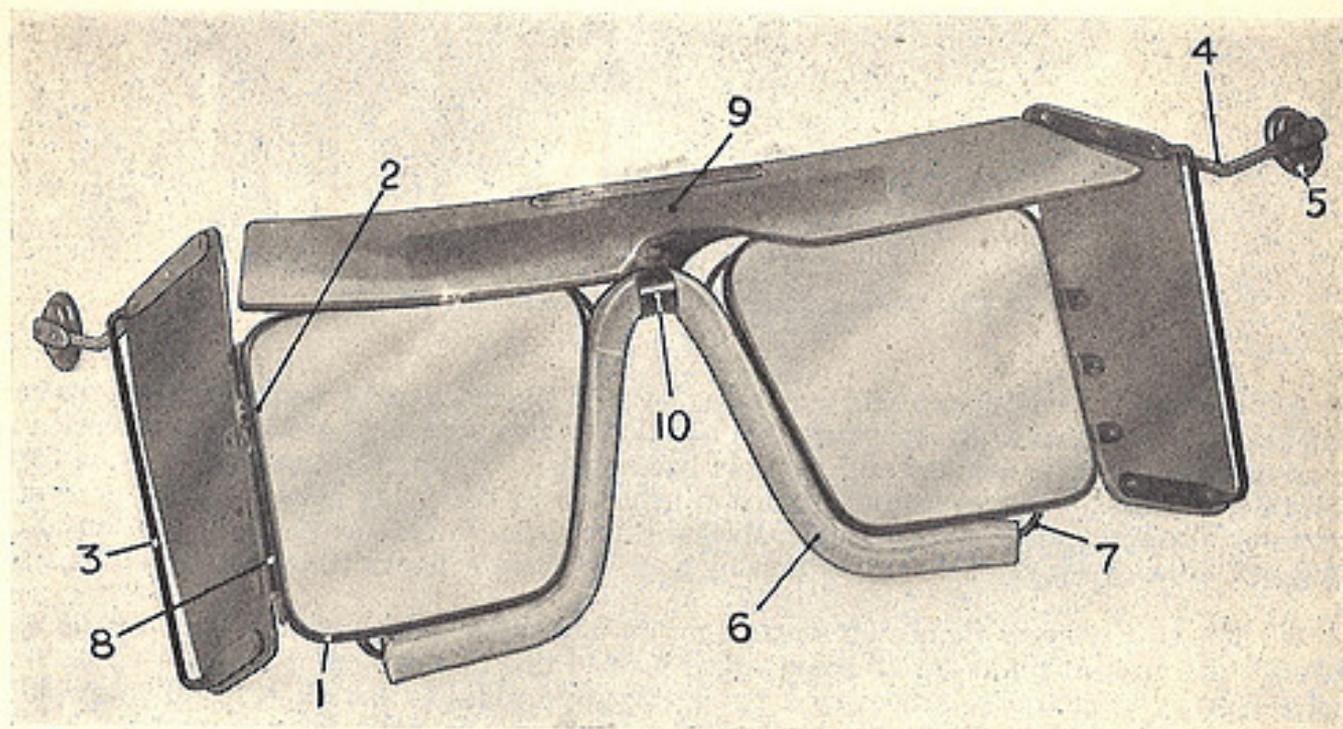


FIG. 1—SPECTACLES OPEN FOR USE

## Description

3. The spectacles have been designed to give a maximum range of vision compatible with the comfort of the wearer. They are light in weight and will resist a moderate wind, but are definitely for use in closed cabin aeroplanes as they will vibrate if brought into contact with the slip stream of a fast moving aeroplane. Their construction permits adjustments to be made to suit individual features and allows for varying the fitting over the nose to obtain comfort, whilst ensuring against any interference with breathing when pressed on to the face of the wearer.

4. The means by which these general conditions are fulfilled, vary in some details of construction depending on the individual manufacturer, but the essential requirements are met in the types available by making use of a light frame construction to house the windows, two of which are main frontal vision windows and two are side shields, each shaped to give the maximum clear vision, the frames being well clear of the direct line of sight. The side shield windows are frameless and are directly hinged to the sides of the frontal vision window frames. The vizor is frameless and is hinged at the top.

5. The spectacles illustrated in fig. 1 consist of a light frame or frames (1) which grip the windows which they enclose, by means of the split portion of the frame at (2), which has lugs secured to it. This may be seen more clearly in fig. 2 which shows an enlarged view of this joint. One of these lugs (1) is secured to the frame above the split, and the two others, of which one is seen in this illustration, are spaced apart and attached to the frame below the split. A long threaded screw (3) passes through these lugs and when screwed up grips the windows in the frame, the lug (2) being threaded. This grip fixing also serves as a hinge as will be seen by reference again to fig. 1. The two lugs below the split in the frame form hinge-pin bearings and engage the hinge-pin bearing of a hinge plate (8) which is riveted to each side window and is held in position by means of the long pin screw (3) which passes through it.

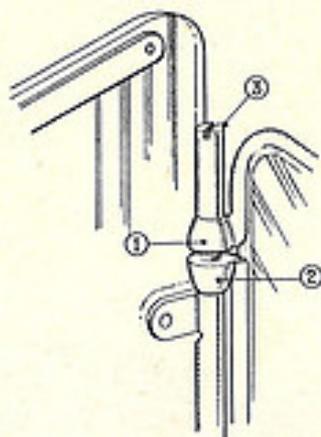


FIG. 2 —ENLARGED VIEW OF WINDOW FRAME GRIP

6. Each side-window has a stiff wire loop (3, fig. 1) riveted to it by means of which the head band may be attached to the spectacles. In addition to this wire loop, a stiff wire extension (4) is riveted to each side window and projects backwards. It carries the female portion (5) of a press-stud which engages the male portion attached to the flying helmet. This press-stud fastening also serves as a pivot which enables the spectacles to be moved off the face on to the forehead, where they are held in position by a catch-hook or hooks fastened to the helmet.

7. The two window frames are carried on an adjustable bridge-piece which can be seen through the vizor at (9) in fig. 1. An enlarged view of this bridge-piece is given in fig. 3. Two hinge plates (1), each of which carry a screw (2), are secured to the top edge of the window frames. A slotted plate (3), with a hook grip in the centre to carry the nose pad (4), bridges the space between the two windows and, by means of the screws (2), operating in the slots of the plate (3), hold the windows clamped into position, whilst they remain adjustable by means of these screws and slots. The hinge-pin bearing portion of the hinge plates (1) carries a spare rod (5) and on this rod is carried the centre portion of the hinge (6), which is riveted to the vizor. The hinge-pin bearings are provided with a tapped bush about their centre and a taper screw (8) which enters at each outer end and, bearing upon the end of the square rod (5), enables centre adjustments to be made to the vizor; this is illustrated in the enlarged sketch in fig. 3. The centre hinge plate (6) has a notching device incorporated so that a spring-loaded dog-clutch enables the vizor to take up any one of four pre-set positions when it is moved by gentle pressure, the four positions being:—vertical, that is pointing straight upwards when out of use; horizontal; 45 degrees down; and parallel in front of the windows.

8. Referring again to fig. 1, a wire (7) is secured to each of the window frames and, in conjunction with the hook (10) on the bridge-plate, carries a piece of sponge rubber of circular section which is split along its length and sewn on to the wires. The rubber has a smooth exterior surface and provides comfort in wearing the spectacles as well as filling up the gap between the spectacles and the oxygen mask and nose. In subsequent issues a moulded sponge rubber pad, also with a smooth exterior surface and similarly fitted, is incorporated instead of the rubber illustrated in fig. 1. A small sponge rubber pad is sewn on to the bridge-plate above the hook to rest on the bridge of the nose. This can be seen at (9) in fig. 3. All metal parts of the spectacles are finished black.

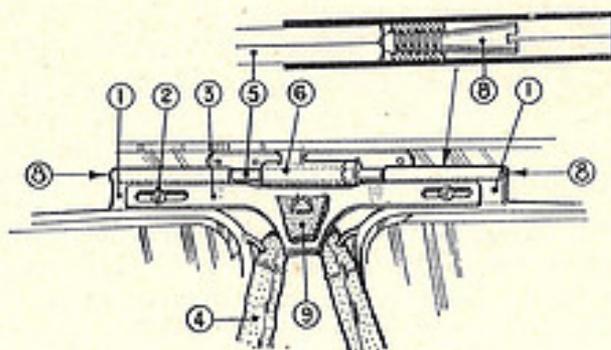


FIG 3.—ENLARGED VIEW OF BRIDGE AND VIZOR ADJUSTMENT

#### Carrying case

9. The spectacles fold up when not in use, as illustrated in fig. 4 (a). The head strap shown at (b) is both elastic and adjustable so that it can be arranged to produce exactly the right degree of tension both to retain the spectacles in position and for comfort. A leather wallet shown at (c) contains the spare windows, a screwdriver for making window changes and adjustments, and a tube of cleaning compound. This whole equipment together with an explanatory booklet is contained in a leather case which is illustrated at (d) in the same figure. When first issued this case also contains the two loose portions of the press-studs which are to be attached to the helmet and the catch hook or hooks for attachment to the forehead of the helmet. The case is  $6\frac{1}{2}$  in. long by  $3\frac{1}{2}$  in. high by  $2\frac{3}{8}$  in. deep and is fastened by a flap and two press-studs.

#### Windows

10. The windows which can be supplied with the spectacles cover a wide range of light conditions.

- (i) Crookes A.2 (light blue). These are for use in various intensities of light to suit individual requirements.
- (ii) Clear. These are normally spares and are housed in a pocket in the wallet.
- (iii) Crookes B.1 (brown). Similar to (i).
- (iv) Polaroid (dark green). These are supplied fitted to the MK. VA\* spectacles and are used in submarine detection or whenever there is glare from water. It should be noted in regard to the polaroid windows that they are best used with the aeroplane window open. When an aeroplane is in flight an obscuration of its windows may occur due to the strains set up in them owing to air pressure.

#### Operation

11. The first requirement is to make provision for fitting the spectacles to the flying helmet. If the helmet is new, the ear pieces should be fitted and sewn in position before any attempt is made to fix the spectacle attachments. When this requirement is completed, the helmet should be put on and adjusted for flight. Operations in the following sequence should then be carried out:—

- (i) Hold the spectacles by the side windows, with the thumbs pressing the female half of the press-stud on the spectacles against the sides of the helmet. Allow the spectacles to fall over the bridge of the nose, as near to the eyelashes as is possible, compatible with comfort. They should be tilted very slightly forward, so that the lower edge is rather nearer the face than the upper edge.
- (ii) By trial, find the position which allows the spectacles to lie comfortably, and also to be turned upwards beyond the line of vision and to lie against the front of the helmet. Repeat the movement several times to make certain that it is freely and easily accomplished.
- (iii) The position indicated by the press-studs should be marked upon the helmet, and also the height at which the catch-hook or hooks are to be set on the forehead of the helmet, for holding the spectacles when they have been pushed up.
- (iv) The helmet portion of the press-stud fasteners and the catch-hook or hooks for the helmet should be sewn on in their appropriate positions on the helmet, ensuring in so doing that there is room for the spectacles to be slipped easily from the forehead on to the face. It is important that this fitting should be carried out with great care.

12. The next adjustment should be that of obtaining the best and most comfortable setting of the bridge piece in regard to the bridge of the nose. This is accomplished by loosening the screws (8) and (2) shown in fig. 3. The relative screw movements are quite small and delicate, and the screwdriver provided in the wallet should be used for these adjustments. When these screws are loosened, the frames can be slid apart along the axis of the bridge-plate (3).

13. The actual adjustment, made when the screws (8) and (2) are loosened, is performed by holding the windows near the top of the frames and sliding them together or apart until the nose pad rests comfortably and deeply without interfering with the breathing of the wearer. When the correct adjustment has been obtained, the screws (8) and (2) should be tightened.

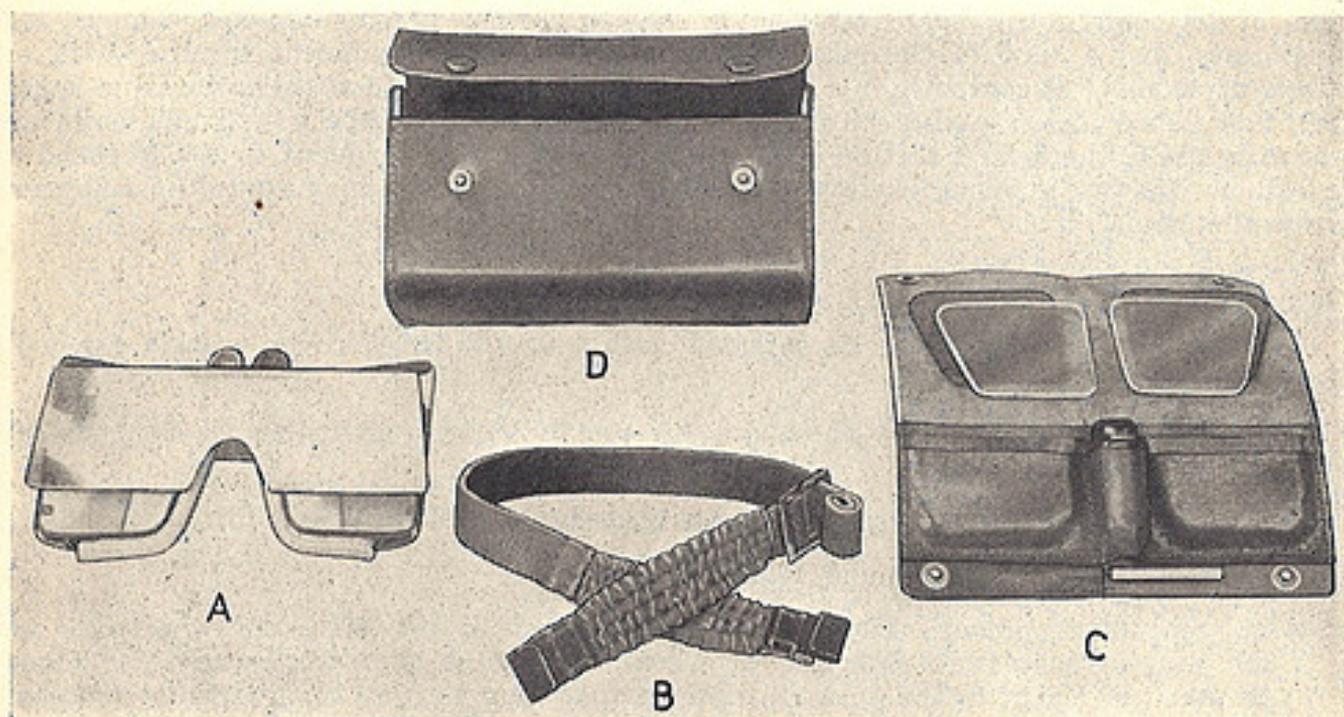


FIG. 4—CARRYING CASE AND CONTENTS

14. The spectacles can now be fitted to the helmet by engaging the female portions of the press-studs on the spectacles with the corresponding male portion on each side of the helmet. The spectacles will then rotate about these press-studs and enable the wearer to use them comfortably, or to swing them up on to the catch-hook or hooks on the forehead of his helmet when not in use. Release of the spectacles from the forehead of the helmet needs to be practised, but can be simply and quickly performed after a few such movements.

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