

SIXPENCE



how to
choose a
binocular

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WITH FOREWORD BY
RAYMOND GLENDENNING

J.A. DAVIS & SON LTD.
OF DENMARK HILL + LONDON S.E.5

foreword

Dear Reader,

So you'd like a binocular. Well, lots of people have written me from time to time asking what sort of glass they should choose and where they should get it. Usually they haven't told me the exact purpose for which it is required, and so it's been difficult for me to answer right away.

The selection of the binocular best adapted to your needs requires some thought beforehand, and a certain knowledge of what to expect from any particular model, if you are to get the best results. After all, I can't go on a racecourse and expect to know all the colours of the horses in any particular race unless I've done a bit of homework first.

Here's your homework then—but believe me, reading this pamphlet is not condemning you to a lot of drudgery—quite the opposite. In it you will find a lot of facts plus a bit of history that will not only help you to choose the glass you require but make enjoyable reading too.

So now, in the hope that it will guide you to the right choice—"DENHILL".

I remain,

Yours sincerely,



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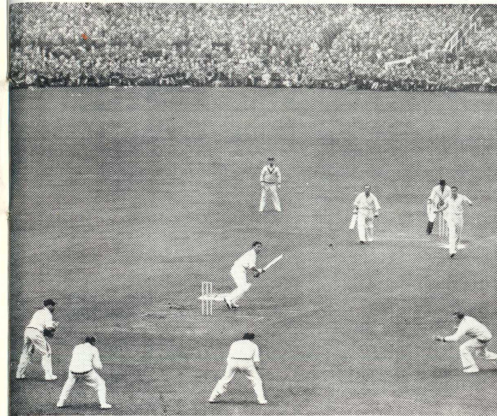
introduction

As binoculars become more and more popular, so more and more people are wondering "How shall I know which binocular to choose?" It is obvious that not everyone can have the technical and practical knowledge necessary to make the right choice, and whilst it looks easy to buy the best of anything by paying the highest price, price is not always the best criterion.

If you know where to go, and what points to look for, the goods which are best suited to your purpose can be obtained at the right price! That is our reason for presenting this booklet. Read it through—it is really quite interesting—and you will be in the position to come to us and choose the right binocular—probably a DENHILL.

Of course, if you still have any queries after reading this booklet, we shall be only too happy to answer them.

CRICKET



General view.



As seen through 8×32 Denhill.

MIDDLESEX v NORTHANTS

RACING



As seen through 8×30 Denhill.



General view of the field.

GRAND NATIONAL—AINTREE—BECHERS BROOK



a short history of binoculars

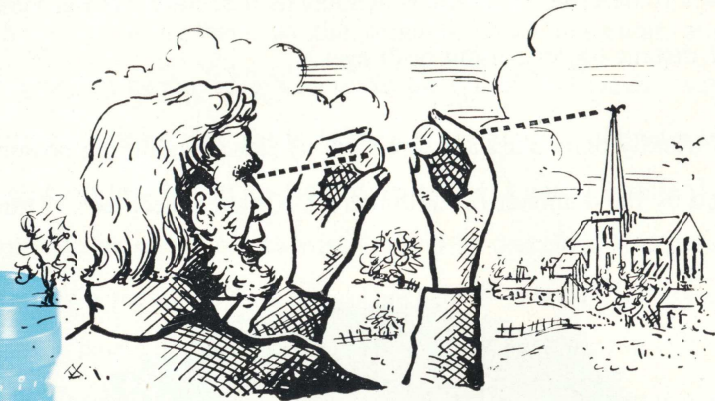
THE manufacture of binoculars goes back quite a number of years, and it is believed that the first binocular was produced as early as 1609 by Johann Lippeshey of Holland. We say "believed" because there is some doubt as regards the good faith of his claim, since two spectacle manufacturers from Middleburg and one from Alkmaar also lay claim to the honour.

The generally accepted story, however, is that Lippeshey was outside his shop one day holding up a spectacle lens in either hand. He happened to direct these, one behind the other, towards the steeple of a neighbouring church, and was astonished on looking through the nearer lens, to find the weathercock appeared closer and more distinct. He immediately rushed inside and put the lenses into a tube—to adjust and preserve their relative distances. Not satisfied with this he set to work to make a telescope and by putting them together presented to the world the forerunner of our modern binocular.

There was little further development until early in the nineteenth century, when Johann Frederick Voigtlander—a well-known name in connection with modern German binoculars—re-introduced the Dutch binocular, which was subsequently enlarged and improved upon.

It was not until 1859 though that anything approaching the modern binocular was made, and even then A. A. Boulanger, its inventor, overlooked the possibilities of increasing the distance between the objective lenses by the use of prisms. When this was eventually done in 1875 by a Frenchman, Camille Nacet, a far better stereoscopic effect was given but it still met with little popularity, for it was considered impossible to obtain the fine glass needed for the prisms. At the glass works at Jena

—and here we mention another great name in German Binocular Manufacture—the founder, E. Abbe, overcame this difficulty and, independently of his predecessors, effected wider separation of the objective lens.



Lippeshey's principle, though modified, is used even today in the manufacture of prismatic binoculars.

E. Abbe must be one of the most interesting figures in early binocular development. Not only was he passionately interested in Optical Science, but he was also equally devoted to improving the conditions for the working classes. When his long association with Carl Zeiss ended, and Abbe came into sole possession of the Works, he immediately gave them away. In order to ensure that the concern would be directed according to his ideas, he drew up a remarkable document bequeathing the whole of the Zeiss factory to a foundation, who were to direct the scope of work and distribution of profits as he defined. The Russians, however, took little notice of this after the war and when in 1948, depleted and battered, the factory moved to Heiderheim, the foundation had the greatest difficulty in re-starting. But, true to Abbe's ideals, they did start producing again and are now gradually increasing their output.

what is a binocular ?

“BINOCULAR” means, literally, “Two-eyed”. It is the word used to describe an article which lets its user have a closer view of distant objects, using both eyes.

Normally binoculars are described by their magnifying power, and by the diameter (in millimetres) of their object lens. Thus

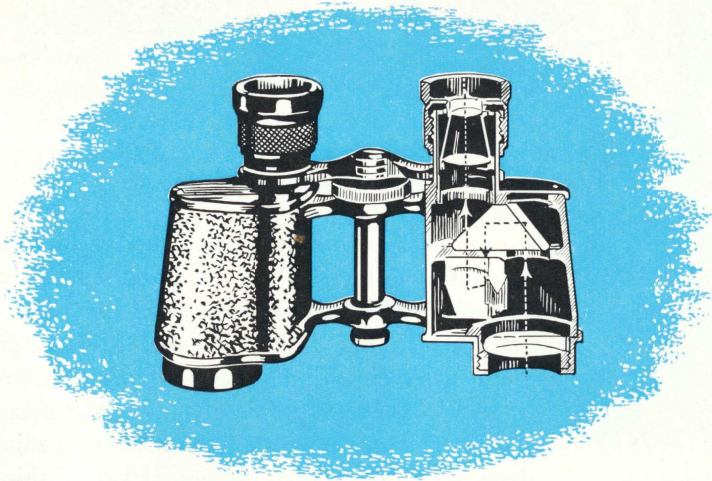


Diagram of light rays through a normal binocular.

an 8×25 binocular has a magnifying power of 8 (it makes objects eight times bigger) and an object lens with a diameter of 25 mm. The magnifying power of a binocular is arrived at

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by the clever arrangement of lenses inside the outer case. The field lens (in the eyepiece) is the powerful magnifying lens, and the object lens (at the other end of the binocular) is the one that gathers light, bringing it together into a manageable picture.

Therefore, going back to the original 8×25 binocular, the magnifying power of 8 will make an object 240 yards away appear to be only 30 yards away, and the 25 mm. diameter of the object lens lets in a specified amount of light to enable the image to be seen more clearly. It will be described later how these two measurements are reconciled to give the best view for any particular purpose.

So we now see that the larger the object lens, the greater will be the quantity of light entering the binocular and, provided the arrangement of lenses and other things are equal, the better and brighter will the image appear. This is the first consideration affecting the brilliance of a binocular's image.

The second consideration is the light transmission—that is, the percentage of light which actually reaches the eyes after entering the binocular. This normally depends on the design and quality of the optical work. Every piece of glass in an optical instrument absorbs light, so in a first-class binocular the optical parts are made of glass of the highest possible transparency in order to reduce this absorption to a minimum.

glass

THE MOST IMPORTANT PART OF A BINOCULAR

ORDINARY glass is of no real use for optical purposes as comparatively thick pieces are required, while for normal purposes very thin sheets are needed. Flint glass, made from sand, carbonate of potash and red lead seemed perfect when viewed in small pieces, but in larger pieces it was found to be so far from homogeneous as to be useless for lens construction.

Optic glass is made to a special formula and when hot, is poured into crucibles of clay to cool. These crucibles are then chipped away, leaving the block of optic glass. Naturally, the larger the piece of glass required, the fewer there are to go in one crucible—and the more expensive the glass becomes. Thus first-class binoculars with high magnification are bound to be fairly expensive.

the exit pupil

AND ITS IMPORTANCE

WHEN you hold a binocular about 15 inches from your eye, pointing to a light, a small circle of light appears. This is known as the exit pupil and can be seen in each eyepiece.

As a scientific method of selecting a binocular, this is of utmost importance and to get maximum efficiency this exit pupil should be as large as the largest pupil of the eye under the worst conditions in which a binocular is likely to be used.

The diameter of the exit pupil should be equal to the diameter of the object lens divided by the magnification. Thus an 8×32 binocular has an exit pupil of $32/8 = 4$ mm.

The pupil size of an average person is detailed below but it must be appreciated that individuals vary considerably.

Age	Day	Night
20	4·8	8·1
30	4·2	7·2
40	3·9	6·1
50	3·6	5·0
60	3·2	4·1
70	2·8	3·3
80	2·2	2·6

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A person whose maximum pupil size does not exceed 4 mm. and who does not require a magnification of more than 6, will find a 6×24 will suit him perfectly; if a magnification of 8 is required an 8×32 will suit him. A larger glass, such as a 6×30 or 6×36 or 8×40 would have little practical advantage, except at night, for the eye cannot receive all the available light—in fact the pupil will contract in order to cut out the light it cannot use in comfort. Therefore a binocular with great light-gathering power is only really advantageous at night or in dull light. Should this same person require a binocular of higher magnification, a 7×28, 8×32, 9×36, 10×40, or 12×48 would give him maximum performance. In this connection it is perhaps worth mentioning that when an exit pupil is the same size as the user's pupil, the width of the binocular must be accurately adjusted by means of bending bars so that the distance between the exit pupils in the two eyepieces exactly corresponds with the distance between the pupils of the user's eyes.

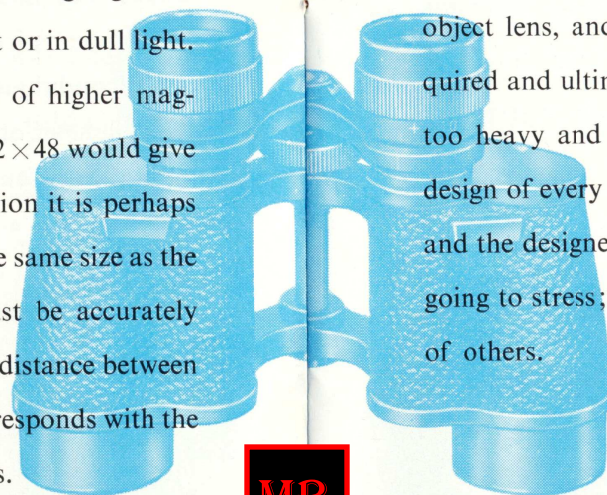
To many people this may seem very complicated, and in many respects it is. It does, however, give the fastidious person scope for choosing the exact binocular to suit him, whilst at the same time allowing the average person to pick any useful magnification and reasonable field of view, provided the binocular does not seem to strain the eyes.

magnification

WHY don't makers go for tremendous magnification all the time? The obvious advantage of a binocular lies in its magnification, but there are limits. An increase in magnification makes the exit pupil smaller and if this becomes too small the binocular becomes aggravatingly uncomfortable to use. This discomfort can only be overcome by enlarging the size of the object lens, and here again larger optical parts would be required and ultimately a binocular would emerge that was both too heavy and too cumbersome for any practical use. The design of every binocular therefore is a matter of compromise, and the designer must decide which particular advantage he is going to stress; for he can only stress one value at the expense of others.

depth

WHEN a landscape is seen with the naked eye, the effects of relief and shades of depth are so normal as to be taken for granted. In a good pair of binoculars, however, this stereoscopic effect is greatly improved and the resulting picture is very pleasing.



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FOOTBALL



As seen through Denhill 8 × 25



View of 'Spurs first goal.



**TOTTENHAM HOTSPUR
v WOLVERHAMPTON WANDERERS**

BIRD WATCHING



**MALE AND FEMALE FLYCATCHER
—SEVENOAKS—KENT**



As seen through Denhill 12 × 40



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but remember, a binocular can be likened to a camel—if it gets pushed up in one place, it must be pushed down in another! So much then for the purely technical details of a binocular. If the reader is still with us at this point he should by now have some idea what goes on inside a binocular, and why. However, when the choice is before him, there are many other considerations which should be borne in mind. Price, weight and size, separate eyepiece or central focussing, bloomed or unbloomed lens and the purpose for which the instrument is required. There is too, the source from which you purchase to be considered if you desire complete satisfaction. So let us have a look at all these points in turn.

the choices before you

Separate Eyepiece or Central Focussing

MOST binoculars today are made with central focussing, which enables the focus to be changed immediately by means of the central wheel. This is generally preferred by most ordinary users such as racegoers, holidaymakers, football and cricket enthusiasts and tourists. For a slightly more specialised use such as mountaineering or when extra strength is required, separate eyepiece focussing is recommended as there are fewer moving parts and they can be made virtually 100% proof against dust and moisture; thus separate focussing should be chosen if use is to be made of them at sea or in hot climates.

Adjustment

With both form of focussing, however, there are two calibrated scales which facilitate quick focussing—if for instance one suddenly wants to focus on to an object after a friend has used the binoculars.

The first scale is on the bending bar and by the use of this, the distance between the eyepieces for each person can be recorded. The other calibration is on one of the eyepieces in central wheel focussing (on both eyepieces naturally in separate eyepiece

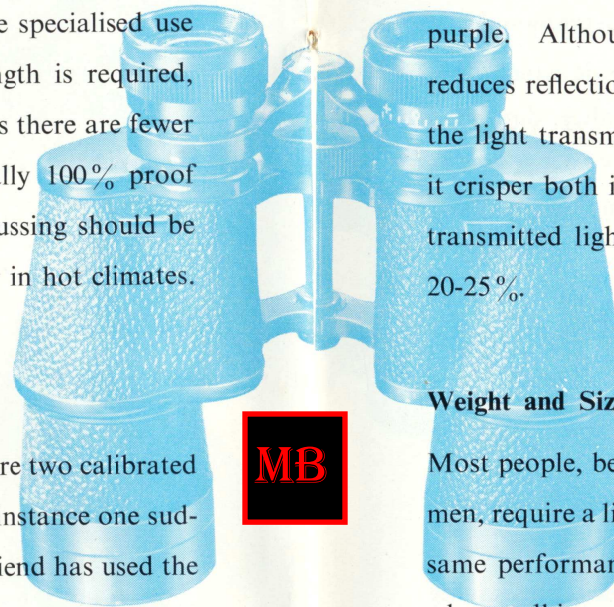
focussing) and is usually calibrated for -3 to $+3$. This allows for any variation there may be in strength in the viewer's eyes.

Bloomed or Unbloomed

Blooming or coating a lens consists of painting (a loose word for a technical process) a very thin layer of mineral, usually a fluoride, on each glass surface, rendering it a rich shade of purple. Although you might think the opposite, this coating reduces reflection losses to a minimum and actually increases the light transmission, so brightening the image, and making it crisper both in detail and contrast. Indeed the increase of transmitted light in a bloomed binocular is in the region of 20-25%.

Weight and Size

Most people, be they elderly, invalid, or even energetic sportsmen, require a lightweight, small glass. Though not giving the same performance as a more powerful model the advantages when walking or travelling are obvious. It can also be held very much steadier for long periods without strain. On the other hand in dull light the performance of such a glass will tend to fall off, and it will not stand much hard or rough treatment.



price

As with most other articles, binoculars vary considerably in price, but provided a pair is bought from a reputable firm, any binocular is value for money. The more expensive they are, the better the workmanship, the quality of optic glass used and the finish. The best binoculars are made through and through as precision instruments, and the cost of working to very high standards is more expensive than working to a lower one.

There always have been cheap binoculars on sale which have satisfied some people, but the difference in quality, durability and eye comfort of the better glass will not only be a source of greater pleasure, but also an assurance that money has been well spent.

denhill

To the average person price is of great importance. To ensure a really serviceable binocular at a reasonable price, it is wise to buy from a firm which imports direct from the Continental Manufacturers in large quantities, without cases, thus saving excessive import duty and giving work to the British Craftsmen who make them. These cases, made specially for the Denhill binoculars are of top quality leather which, like the binoculars, will last a lifetime, and are at the same time lightweight and very well finished.

caution

THERE are one or two misleading statements which have been put before the public from time to time. Two of them are mentioned below:—

1. *Range.* There is no such thing as a binocular having “a great range” or “a range of 100 miles”. In fog, naturally, the range is next to nothing. On a bright clear evening the stars or any distant object can be clearly seen with any reliable binocular, but it would be ridiculous to say it had a range of “over 200,000 miles”.

2. Although Denhill are the best binoculars for everyday use, if the more expensive, specialised German binoculars are required, be sure to buy a pair with a genuine reputable German name, such as Zeiss, Voigtlander or Wohler for instance. Some dealers use German names to sell binoculars which are cheap and inferior in pattern and design.



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the right binocular for the job

Now we come to the question: "Which is the right binocular for my particular purpose?" In the following pages we have listed most normal requirements, but if you have any more specialised object in mind we would be happy to try and find the answer for you.

holidays and touring

HERE is when you need the DENHILL 8×25. It is lightweight, easy to carry and an ideal companion on any holiday. It will give hours of pleasure when relaxing in the sun, and for a general purpose, easily handled, inexpensive binocular this is the ideal size. Cyclists, Motor Cyclists and others will agree that this is the perfect glass for any purpose, for it will fit into any reasonable pocket or handbag.

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sporting

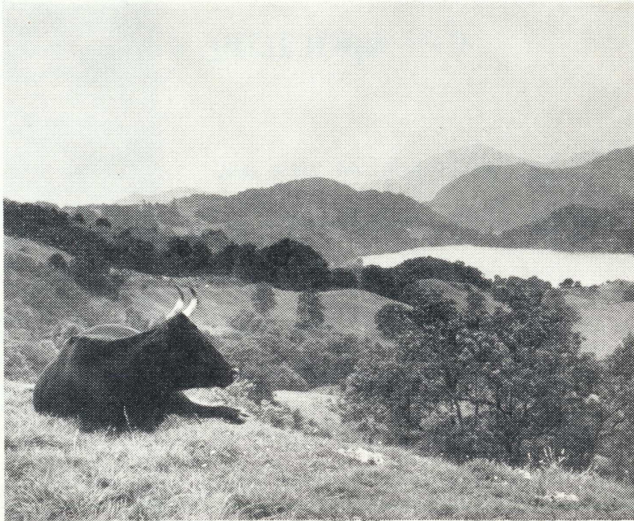
THE wider field of view and the high magnification of this popular little 8×32 glass makes it the ideal sportsman's companion. The sharp definition gives a crisp clearness to vital incidents that might otherwise be missed. It is that which makes binoculars so invaluable in watching sport. These thrilling close-ups make colours and competitors quickly recognisable, and with their light weight these binoculars can be held to the eyes for a long time without strain.



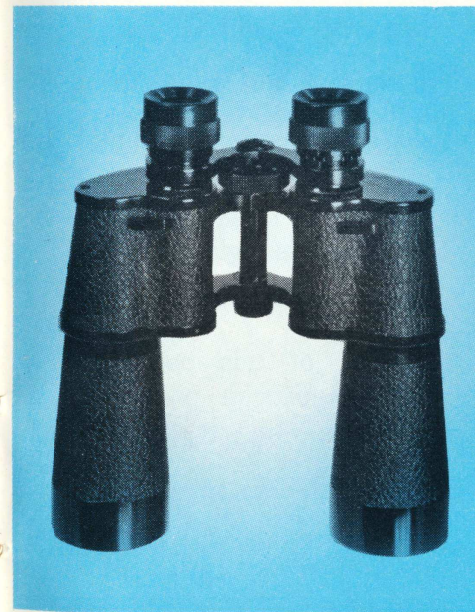
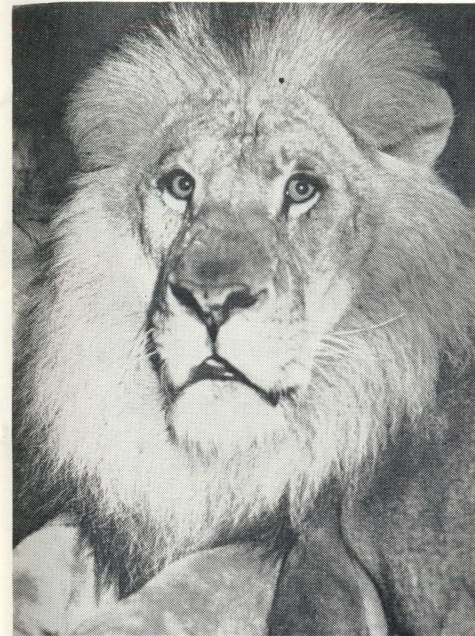
8 × 32 Denhill

hiking and rambling

LIGHT weight, good magnification and a greater field of view are the primary considerations for the climber, hiker and rambler. The Denhill 8×30 provides a wide angle and enhanced stereoscopic effect, and the large optic lens helps to give maximum clarity and brilliance over a wide field. The strong made-to-measure case gives a light compact parcel which can be carried all day without fatigue and is therefore recommended for the Sportsman. On hunting and nature study trips you will find this Denhill model the perfect companion.



8×30 Denhill



15×40 Denhill

long range work

GREAT magnification is the primary consideration for people who want close-up views of distant objects and, whilst these are not recommended for everyday use, the magnificent clarity of detail and brilliance of definition puts the Denhill 10×40 or 15×40 in the forefront of modern binocular design. Bloomed lenses of the finest scientific perfection are employed and with a strong case these glasses will prove ideal companions.



12 × 40 Denhill

bird watchers

DESIGNED to give high magnification combined with wide field of view and great light gathering power, the 12×40 will be found invaluable for those who work at long range and demand clear, crisp detail. They are especially useful in fading light and therefore recommended for naturalists. The 10×35 also is a glass which will be appreciated by the followers of this popular hobby.

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seafarers

A WONDERFUL field of view coupled with a magnification of 10 makes this binocular first choice for use at sea. With no “landmarks”, the larger object lens enables the viewer to scan horizons with skill and speed, and this 10×50, a newcomer to the Denhill Range, will give greater brilliance than any other make of similar size and power.

If a Denhill Binocular does not suit your purpose, J. A. DAVIS & SON LTD. have a wide selection of other models by Zeiss, Voigtlander, Hensoldt, etc., for your consideration.



10 × 50 Denhill

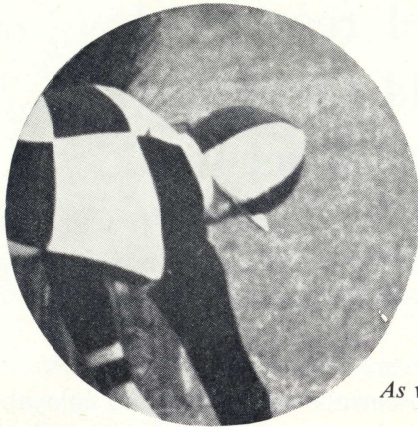
how to look after your binoculars

- 1** STORE your binoculars in as even a temperature as possible. It is a precision instrument, and excess temperatures will cause contraction or expansion which can loosen the Balsam—a transparent “glue”—between the lenses and this will cause small black spots to appear on the lens.
- 2** Any violent blow will naturally cause damage, especially if the cement which keeps the prisms in place is shaken loose.
- 3** As all DENHILL binoculars are sent in “made-to-measure” cases, considerable damage will be done if the focussing is not closed right down before replacing, as distortion of the bending bar will put the binoculars out of alignment.

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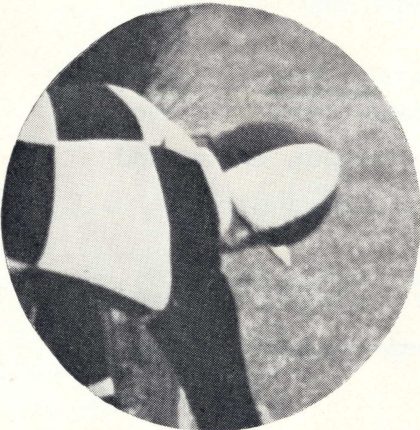
seven good reasons why you should choose a “DENHILL” binocular !

- 1** THE Modern “DENHILL” Binocular is an instrument of precision.
- 2** All outdoor amusements are made more enjoyable with the aid of “DENHILL” Binoculars.
- 3** The “DENHILL” wide angle “central wheel” focussing models are generally preferred by sportsmen, tourists and holidaymakers. They offer immediate easy adjustment.
- 4** The accurately ground and polished “DENHILL” lens and prisms assure sharpness of image, freedom from colour faults and absence of distortion.
- 5** The “DENHILL” series offer a range of magnification and object lens sizes to cover all day- and night-work requirements.
- 6** All “DENHILL” models are complete with carrying case, shoulder sling and lanyard.
- 7** “DENHILL” models are offered on terms to suit every pocket.



As viewed with 8 × 25 Denhill.

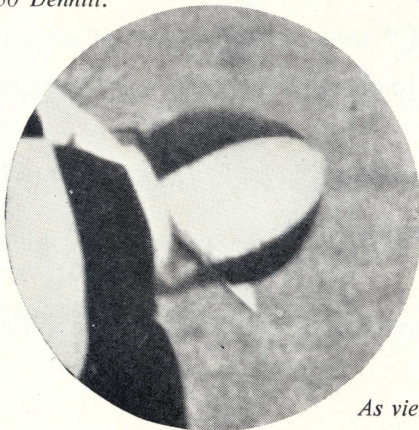
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As viewed with 10 × 50 Denhill.



General view.



As viewed with 15 × 40 Denhill.

WHO ARE DAVIS & SON?

J. A. DAVIS & SON LTD. were founded in 1872, and moved to their present premises, which were built specially, in 1926. As mail order specialists, they were one of the pioneer firms in this ever-growing trade of today. They have always dealt direct with manufacturers in all business whenever possible, thus cutting out any middle profit, and consequently being able to offer merchandise more cheaply than many competitors.

A highly skilled staff, led and encouraged by a vigorous group of young and responsible managers under the direct guidance and control of the Managing Director, is always ready and willing to help and advise in any matter connected with the business. In presenting this new booklet J. A. Davis & Son Ltd. are keeping their tradition of good value in the forefront of their minds, and hope that it will be of great use in helping their many valued customers to decide which binocular to choose.

Our very grateful thanks are due to Mr. J. R. Hebditch, F.S.M.C., F.B.O.A., for permission to use certain extracts from his booklet "Binoculars".

March, 1955

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**RUSSIAN HERO—NATIONAL WINNER,
SOMERSAULTS AT LEICESTER**