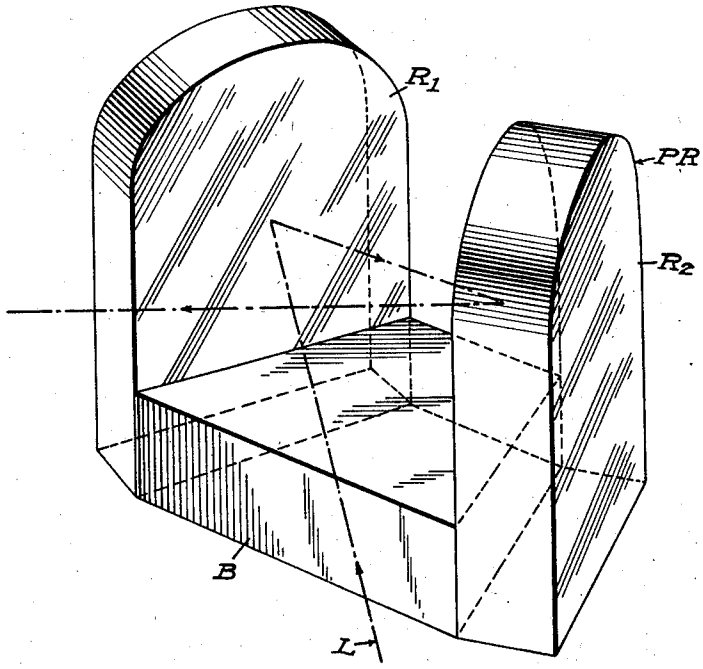
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PENTA-REFLECTOR

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PENTAREFLECTOR

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3 Claims. (Cl. 88—73)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to penta-reflectors particularly adapted for use in optical telemeters of the self-contained base type.

It is a primary object of this invention to provide a penta-reflector that will not distort appreciably when subjected to temperature gradients.

A further object of the invention is to provide a penta-reflector that will not introduce significant errors in a telemeter.

A still further object of the invention is to provide a penta-reflector construction which may be employed as an optical square at each of the opposed ends of a base in a telemeter of the self-contained base type without introducing significant errors through variations in deviations produced by non-uniform expansion arising through temperature gradients.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawing in which:

The single view constituting the drawing is a perspective of a penta-reflector in accordance with the present invention.

In telemeters of the self-contained base type it is conventional practice to employ two reflectors in such manner as to constitute an optical square at each end of the base. Heretofore it has also been the practice to arrange the pair of reflectors at each end of the base in proper spaced relation by means of a block of metal. However I have found that the variations in deviations of the two reflectors at each end of the base due to non-uniform distortion of the metal blocks produced by a temperature gradient is significant. If the metal blocks employed are steel a temperature gradient of 0.01° C. per millimeter along the bisector of the angle between the two reflectors of each optical square or penta-reflector, for a penta-reflector such as is used in a 13-foot telemeter, will change the deviation approximately 2 seconds, giving a total possible error of 4 seconds for the two penta-reflectors. Moreover the reflectors of the present penta-reflectors are of glass and the plane surfaces, under the influence of temperature, become curved to a significant extent, thereby changing the focus and introducing astigmatism.

I have found that by making the penta-reflector entirely of fused silica or similar material of extremely low coefficient of expansion that I can eliminate all distortions of significant degree of the character above referred to arising from a temperature gradient. Fused silica has a coefficient of liner expansion of less than $.5\times10^{-6}$ per degree centigrade at temperatures that may prevail in the atmosphere.

As shown in the drawing the penta-reflector generally indicated at PR comprises a base B and two reflectors R_1, R_2 suitably secured to the base at such included angle as to reflect a ray of light L incident on reflector R_1 to reflector R_2 and from the latter reflector at right angles to the portion of the ray incident upon the reflector R_1. The base and two reflectors are made of fused silica and are preferably joined to each other in the manner shown in the drawing by optical contact. In one experimental test it was found that in subjecting the block B to a 25° C. difference in temperature (approximately 0.5° C. per millimeter) that the measured resulting change in the deviation was 1.4 seconds, this value agreeing with that obtained by computation. This indicates that the variation in the deviation by the fused silica penta-reflector will be quite negligible for the temperature gradients that are encountered in the telemeter.

Having now described a present preferred embodiment of the invention, I claim:

1. A penta-reflector comprising a base and a pair of reflectors joined to each other by optical contact, said base and reflectors being formed of fused silica.

2. A penta-reflector comprising a base and a pair of reflectors joined to said base by optical contact, said base and said reflectors being formed of a material having a coefficient of expansion substantially the same as that of fused silica.

3. A penta-reflector comprising a base and a pair of reflectors joined to said base by optical contact, said base and said reflectors being formed of a material having a coefficient of expansion not greater than the coefficient of expansion of fused silica.

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