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A New Method of Measuring Gage Blocks

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Since the publication of a description of the parallel testing interferometer it has been discovered that this instrument, without modification, is quite applicable to the comparison of lengths of gage blocks. This note describes the testing of gage blocks of all lengths, up to several meters, without having to contact them to optical flats.

Since publishing a description of the parallel testing interferometer [1] this author has realized the applicability of this instrument, without modification, to the comparison of long gage blocks. Accordingly, this note may be considered a supplement to *Parallel Testing Interferometer*.[1]

Figure 1, which is a modification of figure 2 in footnote 1, together with footnote 1, shows the optical arrangement and details of the instrument. The two gage blocks, G and S in figure 1 are placed so that the images of the two ends, facing one prism, are superimposed so that fringes of interference are obtained from the two beams that are reflected from them. The order of interference at the center (usually chosen as the reference point) is a measure of the relative axial position of the two faces. Similarly, the order observed from the other ends of the two blocks is a measure of the relative axial position of these faces. The difference in these two orders of interference, when proper choice of sign is considered, is a measure of the difference in length of the two blocks. Thus, the length of gage blocks can be compared without the necessity of wringing or optically contacting them to optical planes.

If the order of interference observed on one pair of faces is adjusted to zero the difference in length is given by the order of interference observed on the second pair of faces. The length of the unknown block need not approximate the length of the standard. If the difference is large, however, the orders of interference will also be large and monochromatic light of high purity will have to be used to produce fringes of adequate visibility.

This method of measurement permits the attainment of less gravitational distortion of very long blocks than when optical planes are contacted to them. It also permits faster testing because the blocks can be handled without coming into contact with the operator's hands—practically unavoidable in wringing operations—thus eliminating a serious source of thermal disturbance.

The above description of measuring length applies equally well to the testing of short blocks with the "Short-Block Interferometer," also described in footnote 1.

[1] J. B. Saunders, Parallel testing interferometer, J. Research NBS, **61**, 491 (1958) RP2917.

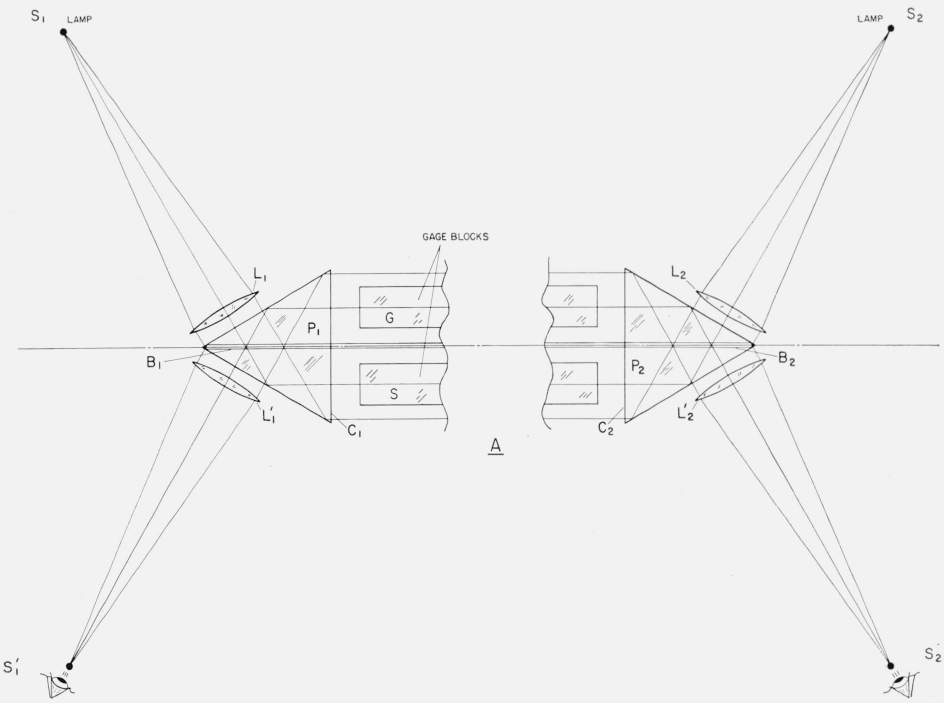

FIGURE 1. *Optics of interferometer for comparison of long gage blocks.*

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