A NEW EXTENSIBLE LEVELLING STAVE.

Dr. Köplitz, Mine Surveyor, of Herne, describes in the *Allgemeine Vermessungs-Nachrichten*, Liebenwerda, No. 2, 11th January 1934, p. 40, a new extensible levelling stave the numbering of which remains consecutive even when its extensible part is not completely drawn out; it may be extended at will from decimetre to decimetre and clamped thus by means of springs, the consecutive numbering being always automatically ensured by means of a steel band, graduated in decimetres, which surrounds the prolongation of the levelling stave. During the lengthening, the numbering on the band rests on the front side of the prolongation, whilst during the housing it disappears on the rear side. So that the band may slide easily round the prolongation, two roller-guides are carried one at each end of the latter.

Although this levelling stave is in the first place intended for underground survey work it may also be used for certain land surveying work, the defects of the ordinary folding stave being completely eliminated in this new design.

The new flexible-band extensible levelling stave is made by the firm of R. Reiss G. m. b. H., Liebenwerda (District of Halle), Germany, and it may be procured from the firm of Gebr. Wichmann G. m. b. H., Düsseldorf, Adlerstrasse, 78; a detailed prospectus may be had on request.

THE HAMMER-FENNEL TACHEOMETER

The Hammer-Fennel Tacheometer is not a new instrument. It has seen much useful service for the past 25 years. A new model, however, was brought out in 1927 embodying improved optical principles in the telescope (*). Its special feature is, that by taking readings on to a graduated staff held vertically at a point, the horizontal distance and the difference of height between the instrument and the point are at once obtained without any further computation. The device which enables this result to be obtained is very simple, and is illustrated in Fig. 2. The dotted lines in the figure are inserted for explanatory purposes, and do not exist on the diagram of the device.

The instrument itself, Fig. 1, consists of an internal focussing telescope 11 inches long, with an object glass of 1.4 inches aperture, and a magnification of 24. The telescope cannot be transited, but it can be rotated on its axis 30° on either side of the horizontal plane. The horizontal circle, of 5 inches diameter, is graduated to 10 minutes and read by a single microscope to 1 minute. There are two levels on the vernier plate and a double level on the telescope. A trough compass is attached to one of the standards. There is no vertical circle, its place being taken by the case which encloses the special device shown in Fig. 2.

The device itself consists of a diagram of curves on a plate-glass *G*. This diagram, or rather a portion of it at a time, appears inverted in the telescope. *ZZ* is the zero-curve, and is a segment of a circle which has *O*, the axis of the telescope, as its centre. *DD* is the distance-curve; + *HC* the portion of the height-curve indicating an elevation, and - *HC* the portion indicating a depression. This diagram is brought into the field of view of the telescope by means of two prisms and an intervening lens (see Figs. 3 & 4).

Looking now into the telescope, a fixed horizontal wire is seen stretching across the top of the field. The right half of the field is otherwise quite clear. On the left appears a portion of the diagram cut off sharp by the perpendicular edge of one of the prisms. This forms the line which is brought into coincidence with the edge of the staff held at some distant point, the fixed wire being at the same time made to bisect the zero line of the staff. As the telescope is moved about its axis the diagram appears to move across the left half of the field of view. The zero-curve is always tangent to the fixed wire at the point of intersection with the vertical edge of the prism.

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