It will be observed that although in the example given the conditions afford a very good "Station Pointer" Fix, the arcs drawn from x and y cut one another at an oblique angle and, when plotting the whole angle, those drawn from A and C also cut even more obliquely; therefore, unless extreme accuracy in obtaining the Distances from the Traverse Tables and plotting same is observed, the resulting cuts at S may form a "cocked hat" with consequent doubt as to the exact position. This graphic method of plotting is therefore hardly suitable for Marine Surveying although it may be very useful for ordinary Navigation.

J. D. N.

THE CARE OF INSTRUMENTS

(Extract from *The Military Engineer*, No. 147, Washington, May-June, 1934, page 230).

The following notes on the care of surveying instruments are furnished by the Coast and Geodetic Survey:

No matter with what ruggedness surveying instruments may be designed, they are, nevertheless, of a precision character, and a certain respect must be accorded them in their care and handling. It is usually necessary to construct them of materials of a fairly soft character. It is also necessary to keep their weight down to a reasonable figure; consequently, they are to a certain extent structurally weak, or better, not strong. This means that they must be protected against sudden and violent shocks.

Cleanliness in a precise instrument is perhaps as important as it is in the hospital. If the bearing surfaces become dirty, or if the oil becomes at all gummy or thick, the quality of the bearing may be destroyed for the time being. Metal bearings really are not a metal to metal contact. When such contact obtains, friction results. Consequently a lubricant, such as oil, is introduced and the one part actually floats on a thin film of oil, which separates it from the other. If this oil film becomes thick or viscous, the bearing parts will be separated too far, the oil film will yield, allowing the bearing to cant and, in the case of theodolites, will cause an irregular eccentricity. It is recommended that the bearings be carefully cleaned with alcohol or benzine (alcohol preferred) and fresh oil used. The oil should be applied with a lintless cloth, and only an absolute minimum applied where bearings must be a close fit.

It is recommended that graduated surfaces of precision instruments never be wiped. If dust accumulates on them, it should be carefully blown away or removed with a clean camels' hair brush. Graduations are usually on very soft silver, and grit will quickly imbed itself into this surface and cause scratches if any pressure is brought to bear upon it, such as would be the case in wiping.

In packing equipment for shipment, it should be remembered that the case may be inverted, and care should be taken that nothing can come loose and rattle about. This should be particularly observed where a number of items are packed in one box. There have been instances in which instruments of a fairly precise character were packed in a box which also contained a heavy weight which was not fastened down, with resultant detriment to everything except the weight. Sawdust should never be used in packing instruments, as the extremely fine dust from it seems to be able almost to penetrate hermetically sealed joints. It has the disadvantage that it is a very ready absorbent of oil and if it gets on an oiled bearing the bearing promptly becomes dry and the instrument, in all likelihood, inoperative. Sawdust also readily holds moisture, and damage may occur through this cause. It is also advisable not to use excelsior, if it can be avoided, for the same reason. Shredded paper, of a good quality, is probably best.