than in those of liquids. This also would be the case on the assumption of incoherence.

A further observation may be of interest. Raman remarks on the peculiar polarised 'fluorescence' of glycerine. Prof. J. C. McLennan has very kindly placed at my disposal a large Hilger spectrograph for the study of the light scattered by glycerine. The mercury lines comprising the ordinary scattering show very clearly in the region studied (from about 3200 A. to 5800 A. on a nine-inch plate), but no modified lines appear. Instead, there extends across the whole region photographed a single fluorescent band which is quite continuous even at the considerable dispersion afforded by this instrument. This 'fluorescent' band is partially polarised.

Raman has found similar though much narrower bands in the scattered spectrum of water and of methyl alcohol. The presence of such a very wide band in the spectrum of glycerine lends support to the inference that the broadening out of the modified lines to bands is associated with the presence of the (OH) group in the formula.

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Aug 20.

Range of Audibility of Gunfire.

AT a time when considerable attention is being given to 'abnormal' propagation of sound, cases of exceptionally long range 'normal' propagation may be of interest.

On July 4, at about 1.23 P.M., a sound like distant gunfire, accompanied by a feeble rattle of windows, was heard at my house in Hythe, and I found on telephoning Dr. Tucker (who is warned by Dr. Whipple about firing practice at the Isle of Grain) that he had received a telegram announcing firing at this time. On tuning in my wireless set to 5XX, the signals broadcast by the B.B.C. giving the instant of firing were picked up, and the intervals between firing and the arrival of the sound were timed by my watch for eight rounds. The wireless signals ceased at about 2.0 P.M. but the gun was heard for at least half an hour longer, at roughly four-minute intervals.

The time of travel of the sound was 2 min. 33 sec. for two rounds, which were both described at the time as heard very feebly but distinctly indoors; 2 min. 34 sec. for five rounds, which were variously described as 'scarcely audible' to 'quite loud, shaking window,' and 2 min. 35 sec. for one round which was heard loudly.

The distance from my position to the gun was 168,750 feet, and the average time of travel was 2 min. 33·9 sec., giving a velocity of 1096 feet per second. The bearing of my position from the gun was 148° to the nearest degree.

The gun was again heard by several observers near Lympne and at Newchurch several miles farther west, on Aug. 2. At Lympne it was only heard with close attention in a sheltered position outdoors, but at Newchurch it was heard more plainly. The distances from the gun were 166,600 feet and 163,150 feet respectively. Timing was done at Lympne by chronometers ticking half seconds and at Newchurch by $\frac{1}{5}$th second stop watches. The average time for six rounds at Newchurch was 147·3 sec., giving a velocity of 1107·7 feet per second. The average time for four rounds at Lympne was 150·4 sec., giving a velocity of 1107·6 feet per second. The bearing of Lympne from the gun was 150° and the bearing of Newchurch was 160° to the nearest degree.

From a casual inspection of meteorological data for these days, it would appear that the path of the sound was much more direct on Aug. 2 than on July 4.

P. ROTHWELL.

Air Defence Experimental Establishment,
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Westerham, Kent, Sept. 6.

Photographic Enlargement of Small Solid Objects.

IN NATURE of Aug. 18, p. 239, Mr. A. Mallock makes the admirable suggestion that the required magnification should be obtained, not directly, but by ordinary enlargement from a negative showing the object on some lower scale—the intermediate negative being of course taken to such a standard of sharpness as will permit of the subsequent enlargement. This seems to be the only way by which the great difficulties of this kind of work can be overcome. The most troublesome business of all is that of focusing, and this could be entirely eliminated if a simple form of enlarging camera were carefully and permanently registered to give perfect focus on some one fixed intermediate scale, and means were provided for measuring exactly the depth of the object about to be photographed, and for putting the object in its proper position in front of the lens.

In the *British Journal of Photography* of Oct. 30 and Nov. 6 and 13, 1925, under the heading "Low Magnification Photography," I endeavoured to write something useful on this subject, and I was thrown back on the method now suggested as the only practicable one. For higher magnifications, the apparatus was registered to give a direct three diameter negative, while for magnifications from one to three diameters, it was registered to give natural size. A very sensitive 'focus register' was described which served the double purpose of measuring the photographic depth of the object and placing it in position.

It is a pity that Mr. Mallock has deserted the usual method of defining the sharpness of a photograph by the diameter of the blurs or confusion circles on the negative which represent points on the object, as nothing seems to be gained by the change and his argument is not easy to follow. The example he has chosen—a twenty diameter enlargement of a tenth of an inch depth of object—is also very extreme and scarcely practicable, at least with a 0·1 inch stop. The resulting blurs in this case, as shown by his very useful formulæ, would be 0·02 inches in diameter, or twice that allowed by the lowest accepted standard of sharpness.

The extent to which magnification can be carried out will depend upon the smallness of the stops that can be used without introducing diffraction and other troubles. For this and other technical reasons I was compelled to draw the line at a maximum of magnification of ten diameters. But between one and ten diameters or less, an immense variety of useful and interesting work for the photographic illustration of books lies waiting to be done. H. C. BROWNE.

Dublin, Sept. 6.

Can the Hand be thrust in Molten Lead without Injury?

In reply to Mr. A. S. E. Ackermann's inquiry in NATURE, Sept. 8, p. 349: Some thirty years ago I gave a popular lecture on "Flat Irons and the Spheroidal State" at Birkbeck College, at the end of which I illustrated the ancient ordeal of fire by plunging my hand—up to the wrist—into about 80 lb. of molten lead. The lead must be hot—that is the secret.

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