india-rubber about $\frac{1}{8}$-inch thick, firmly attached by a slot and screwed bar to each roller, completes the arrangement.

The rollers being wound through about one entire revolution, and the india-rubber being thus stretched tight, layers of cloth, clay, paste or other giving material, are laid upon it. The handle is then turned in the reverse direction, and the india-rubber gradually released. Folds are in this way shown slowly growing—the broad elastic band simulating the contraction of a portion of the earth's crust. In Figs. 2 and 3, cloths are seen

FIG. 2.

FIG 3.

folded thus—first, without superincumbent weight, and second, with a weight of 30 lbs.

That the larger folds are those generated at the surface, and the smaller and more numerous those produced under pressure (*i.e.* at great depths), is here made evident.

By substituting blocks of stone or wood for ordinary weights above the cloths (Fig. 4) and repeating the experiment, some of the relations between folding and faulting are clearly shown.

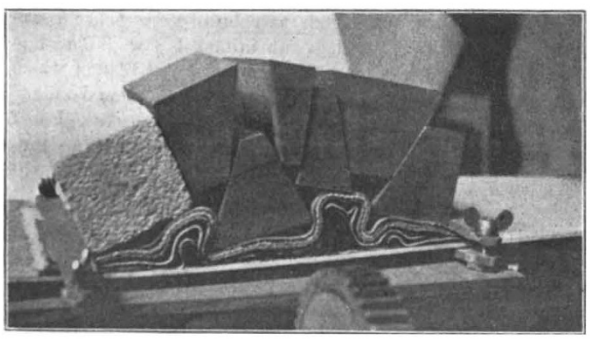

FIG. 4.

If clay be used instead of cloths, all the results of Favre's well-known experiments (*Arch. d. Sciences Phys. et Nat.*, 1878, and also NATURE), and many of those described by Cadell, Bailey Willis and others, can be obtained, and with the exercise of a little ingenuity it is easy to vary the experiments so as to reproduce a large number of the fold-forms known, and to illustrate their consequences—thrusts, faults, &c.

This machine was made for me in 1880 by the late Mr. C. D. Austen, of Newcastle-upon-Tyne, from my designs.

G. A. LEBOUR.

The Durham College of Science, Newcastle-upon-Tyne, August 18.

Scoring at Rifle Matches.

IN his letter to NATURE of August 17, Mr. Mallock appears to assume that there is such a thing as abstract "accuracy" in estimating the value of a marksman's score. The method in use at Bisley is, as I understand him, to be regarded as a rough approximation to the accurate method, whether the best available approximation or not. Is it not rather the case that the standard of accuracy is itself arbitrary, and what the authorities at Bisley have established is not an approximation to an ideal standard, but is to be regarded as a real standard of excellence?

In result Mr. Mallock's "accurate" method is this: in his notation any two scores for which $R^2+\rho^2$ is the same are of equal merit, or that one for which $R^2+\rho^2$ has the least value is the best score. Now, if "a" be the distance of any shot mark from the bull's-eye, n the number of shots, $R^2+\rho^2=\Sigma a^2/n$. Mr. Mallock's standard, then, is that the best score is that for which the sum of the squares of the distances from the bull's-eye is minimum. I see no reason why this method should be regarded as accurate *par excellence*, except the analogy of the method of least squares. But the analogy is misleading.

Where the method of least squares is applicable, the object is to find the most advantageous value of an unknown quantity to be deduced from a number of observations. An accurate value of the quantity does exist. And of two or more results deduced from the observations, that which is nearer to the accurate value is always better than one more remote, however near to the truth either may be.

In rifle shooting, on the other hand, there is generally some finite space—*e.g.* the port-hole of an enemy's ironclad, such that all shots which pass through it are of practically equal value, and all shots which do not pass through it are of little or no value.

This is much more accurately represented by the Bisley method than by the method which Mr. Mallock would substitute for it.

S. H. BURBURY.

THE only remark I should wish to make on Mr. Burbury's letter is that every shot on the target is truly the record of an observation, and that there is every reason to treat these records as far as is practicable by the methods which apply in obtaining the best means of a number of observations. Of course, it is only in the case of "centre of target" competitions the "$R^2+\rho^2$ a minimum" test applies. Prizes might well be given for close grouping, with a penalty depending on the mean distance of the group from the centre of the target.

August 22. A. MALLOCK.

Spectrum Series.

SIR NORMAN LOCKYER'S lectures on "Spectrum Series" seem to show very clearly the important fact that there is a close connection between the valency of an element and the lines in its spectrum.

The connection indicated is as follows:—

Nonvalent elements yield spectra with single lines.

Monovalents yield doubles.

Divalents yield triplets.

On turning to the list given in NATURE (vol. lx. p. 370), it will be seen that helium, by yielding doubles as well as singles, and cobalt, by yielding doubles only, are practically the only discordant cases in Sir Norman Lockyer's list, since aluminium and indium are trivalents, and their anomalous behaviour in yielding doubles only can perhaps be explained.

August 26. W. SEDGWICK.

Magnetic "Lines of Force."

IN some text-books and by some lecturers (*e.g.* Prof. A. Gray, as reported in NATURE of August 17, p. 379), the lines of magnetic force are said to be the curves along which iron filings are marshalled when sifted over a piece of card laid over a horizontally placed magnet.

Surely this is hardly correct. The true lines of magnetic force must be represented, like those of all other radiant forces, by radiating straight lines drawn through the points of action of the resultants of all the forces residing in the individual molecules of a given magnet (such points, though varying in position with the position of a magnetic body in the field, being often referred to as fixed "poles").

The symmetrical figures traced out by iron filings merely show, of course, the directions in which a line joining the poles of a very short magnet will lie in different parts of a magnetic field, under the influence of the true lines of force.

E. R. P.

August 29.

Critical Pressure.—A Suggested New Definition.

THE critical pressure of a substance is commonly defined as "the least pressure that will suffice to reduce that substance from the gaseous to the liquid state when at its critical temperature." But this definition contemplates the matter solely from the stand point of what occurs at the critical temperature, and I think it