

glycerine, known as dynamite, and which is simply powdered glass or sand saturated with the explosive, was applied in the experiments; the force of the dynamite very nearly equals that of nitro-glycerine, and is of course much more readily handled than the liquid explosive itself. Nitro-glycerine or its compounds are the only agents of this nature that can compete in any way with gun-cotton, either as regards its igniting force or cost of production; and for this reason the experiments with these two materials have been watched with particular interest by military men, and have indeed formed the subject of a special report recently submitted to Government by the Committee on Explosives.

The explosive force of detonated dynamite and the Abel gun-cotton, as the compressed or pulped form of this material is termed, was considered to be about equal, and on this account the investigation was more particularly confined to the methods of ignition of the two substances. Professor Abel had already shown, in his communication to the Royal Society, that gun-cotton detonated only under certain conditions and but by the instrumentality of particular agents. And here it should be borne in mind that there exists a very great difference between the detonation and inflammation of gun-cotton. A block of the compressed material, for instance, may be set fire to in an ordinary room without the semblance of danger, the cotton burning vigorously and rapidly, it is true, but without any approach to explosion; ignited, however, by means of a small quantity of fulminate of mercury or fulminate of silver, the explosion is of the most violent description. The fulminates above-named are the only ones found to bring about the ignition of gun-cotton in this truly terrible manner; iodide of nitrogen fails to have any effect thereon, and chloride of nitrogen is occasionally successful in doing so, provided it is employed as a primer in sufficient quantity. While, however, gun-cotton is thus very difficult of detonation, except by the use of special means, nitro-glycerine, or dynamite, readily detonates under ordinary circumstances. That is to say, not only do the fulminates above-mentioned secure its ignition, but percussion-cap and other compositions, as also a sharp concussion, inevitably bring about its combustion.

An interesting experiment will indeed show at once the marked difference between the two explosives. Two wooden boxes were filled with compressed gun-cotton and dynamite respectively, and placed in a suitable position at a rifle range, where they could be hit with certainty by small arms. A bullet was fired at each box, and the results were very conclusive; the dynamite detonated in a terrible manner at the shock, while the gun-cotton was merely inflamed, and burned in a rapid but steady manner.

It was further found that in order to secure certain and perfect detonation, it was always necessary to employ a much larger and more powerful detonating fuze (one containing a large amount of fulminate) for the explosion of gun-cotton than was required for nitro-glycerine, proving beyond doubt, therefore, that the latter is much more readily ignited than the fibrous material. This is of course a great safeguard, and added to the fact that under many circumstances of accidental ignition gun-cotton inflames harmlessly and does not detonate, speaks much in favour of pyroxiline. Indeed the use of nitro-glycerine can, according to our best authorities, be applied only within very narrow limits, as, for instance, for blasting and mining purposes, and its employment even in this sphere necessitates very careful supervision.

From this it will be at once seen that the recent prognostications of several of our war correspondents that the Prussians intend to employ dynamite shells in the bombardment of Paris must be entirely without foundation, for, according to the results obtained by the Explosive Committee in this country, the discharge of a nitro-glycerine shell from a gun would be of itself sufficient to bring about the immediate bursting of the arm itself.

ASSOCIATION FOR THE REFORM OF GEOMETRICAL TEACHING

THE following circular has just been issued:—"For some time past an effort has been made to improve the teaching of Geometry in English schools. The undersigned—all mathematical teachers—are of opinion that good would result from the formation of an Association for the Reform of Geometrical Teaching, and are desirous to elicit the opinion of others who may be interested in the movement. The objects of such an Association would be—1. To collect and distribute information as to the prevailing methods of instruction in geometry practised in this and other countries, and to ascertain whether the desire for change is general. 2. To use its influence to induce examining bodies to frame their questions in geometry without reference to any particular text-book. 3. To stamp with its approval some text-book already published, or to bring out a new one under its own auspices. Should you be willing to become a member of such an Association, you are requested to send your name and address, with a small subscription to meet the necessary expenses of printing advertising, &c., to Mr. Levett, King Edward's School, Birmingham. (Signed) Rawdon Levett, M.A., Senior Mathematical Master, King Edward's School, Birmingham; E. F. M. MacCarthy, M.A., Second Master, presiding over the Modern Department, King Edward's School, Birmingham; J. M. Wilson, M.A., late Fellow of St. John's, Cambridge, Mathematical Master of Rugby School; Robert Tucker, M.A., late Scholar of St. John's College, Cambridge, Hon. Sec. London Mathematical Society, and Mathematical Master, University College School."

A Conference is intended to be held on the 17th of January, 1871, at 2.30 P.M., in the Mathematical Theatre, University College, London, Dr. Hirst in the chair, for the following purposes:—The Association will first be organised. The following resolutions will then be proposed: 1. "That the main object of this Association is to induce all conductors of examinations, at which pupils who have been trained under different systems present themselves, to frame their questions independently of any particular text-book; and that with a view to this object, the members present at this meeting do pledge themselves to use every effort to increase the numbers and extend the influence of the Association." 2. "That with a further view of extending the influence of the Association, local secretaries be appointed for different parts of the kingdom, whose office it shall be to collect information, to make the objects of the Association more generally known in their immediate neighbourhood, and to communicate on all matters of interest with the Central Committee." 3. "That the local secretaries, *ipso facto*, be members of the committee of management." 4. "That all members of the Association shall collect information with regard to text-books and methods of teaching geometry in England and other countries, and that such information shall be forwarded to any secretary or local secretary of the association." 5. "That the committee of management shall, from time to time, print and circulate among others such information as they may consider valuable." 6. "That this meeting is of opinion that in any new text-book—(a) the following principles, only partially or not at all recognised by Euclid, should be adopted:—(i) hypothetical constructions, (ii) the arithmetical definition of proportion, (iii) superposition, (iv) the conception of a moving point, and of a revolving line; (b) the following limitations should be removed:—(i) The restriction of the number of axioms to those only which admit of no proof, (ii) The restriction which excludes all angles not less than two right angles; (c) modern terms, such as locus, projection, &c., should be introduced. These points will be voted upon in detail.