sory military training are to be looked on with grave suspicion. There is the risk of insidious Prussianising. For the undeniable privilege of being part of civilised Europe and for the undeniable distinction of having been willing—on this occasion—to do the right thing at all costs, we shall have to pay a long price, and it is to be feared that part of this price will be the shelving of eugenic endeavours and our connivance thereat. It may be, however, that facts will give the lie to our fears, and that the impoverishment of the possible parent-stock of the future will be in some measure counteracted by an enrichment of our social heritage—perhaps even by a nearer approach than we have ever known to *positive* peace.

STANDARDISING APPARATUS AND METHODS.

SEVERAL circulars recently received from the Bureau of Standards of the Department of Commerce, Washington, well illustrate the untiring industry to be found in the American public offices. Circular No. 9 deals with the standardising of glass volumetric apparatus such as flasks, burettes, pipettes, pyknometers, and measuring cylinders. The bureau aims at encouraging excellence of quality in such apparatus by co-operating with the makers on one hand, and on the other with the users. To this end the circular describes specifications for the various classes of instruments, and the bureau admits for standardising that apparatus only which conforms to the specifications. It is pointed out in the circular that certain of the demands, such as those regarding the quality of the glass and the process of annealing before calibration, are largely dependent for their fulfilment on the integrity and good faith of the manufacturer. Users can therefore help to secure a high degree of excellence by supporting conscientious makers and giving consideration in the first place to quality, and only secondly to the matter of cost. The circular supplies information on such points as the best design of apparatus, the material, the methods of marking the graduations, the units of capacity employed, and the limits of error allowable. There are also directions for the manipulation of the apparatus during testing; and for those who wish to calibrate their own burettes and pipettes a brief description of the method to be employed is given.

Circulars Nos. 36, 48, and 222 deal respectively with industrial gas calorimetry, standard methods of gas testing, and flame standards in photometry. These are technical subjects, and it would be impossible in any moderate space to discuss or criticise the very numerous points raised in these circulars. It may suffice to refer to the last-named, and to state that the variation of the light of flame standards of light as determined by atmospheric conditions and as observed by different observers, or computed by different empirical formulæ, are discussed at length. It is often questioned whether the illuminating power of gas, for example, is more fairly determined by comparison with a flame standard which itself is affected by atmospheric conditions (moisture, CO_2, pressure), or whether a standard which is independent of these conditions, such as an electric filament lamp run under strictly defined conditions, would not be more correct. As the luminosity of the gas flame itself also is affected by atmospheric conditions, though not identically to the same extent as the flame standards of light, the practice in England is to determine the quality of the gas by reference to a flame standard, and to ignore atmospheric conditions. With an invariable standard of light gas of the same quality would appear to differ more according to the weather conditions than it does with a flame standard, and for this reason if very elaborate corrections are to be avoided the use of the variable standard is considered in this country more appropriate than that of an invariable standard.

Three technologic papers issued by the Bureau are devoted to analytical researches, and deal with the determination of ammonia in illuminating gas, the iodine number of linseed and petroleum oils, and the analysis of printing inks. The first of these, by J. D. Edwards, is of more interest in the United States, where the amount of ammonia in illuminating gas is still subject to control than in the country where no ammonia limits are now in force. It deals with the choice of indicators, effect of carbon dioxide on the titration, errors due to solubility of heads, and to incomplete washing, and the choice of absorption apparatus. Paper No. 37, by W. H. Smith and J. B. Tuttle, deals with the iodine number of linseed and petroleum oils. The main point established is that for the iodine solution used (iodine bromide in glacial acetic acid), and probably for other solutions in common use, the conditions of the experiment must be more rigorously fixed than is now usual. Thus 0·1 gram of oil with 25 c.c. of iodine solution gives a lower iodine absorption figure than when the weight of oil and volume of solution are doubled. For mineral oils the absorption increases with excess of iodine, and there is in this case no tendency to reach a constant value. Paper No. 39, on the analysis of printing inks, by the same authors, gives details of the procedure of analysis adopted at the Bureau of Standards for the separation of oil and pigment, the analysis of each separately, and concludes with remarks on the relation of aniline dyes to paper, and on the accuracy obtainable in the analysis.

GASEOUS EXPLOSIONS.[1]

THE investigation of gaseous explosions is of interest to chemists, physicists, and engineers. The chemist studies the laws of combination and dissociation; the physicist deals with modes and rates of inflammation, variation of specific heat, maximum temperatures attained, and laws of radiation and cooling; while the engineer considers both chemical and physical effects as bearing on the practical operation and thermo-dynamics of the internal combustion engine. He also interests himself in the analogous phenomena of inflammable dust explosions as found in coal-mine and flour-mill accidents. The matters of interest are obviously numerous and complicated, and it is accordingly necessary to limit their consideration to a few points. The points selected will be dealt with as they bear more particularly on the engineering problems of the internal combustion engine. In 1907 the British Association, at its Leicester meeting, appointed a committee of investigation. This committee has been at work ever since, and much light has been thrown by the experiments of its members upon the facts connected with gaseous explosions as occurring in closed vessels and within engine cylinders having moving pistons. It is now proposed to describe some of the work of the committee, dealing first with the phenomena of rising temperature, and secondly with that of cooling after explosion.

When a mixture of coal gas and air is ignited within a strong closed vessel, it is found that the pressure rises rapidly, attains a maximum, and falls relatively slowly. To this rapid pressure rise is due the term gaseous explosion. Such explosions are

[1] Abstract of discourse delivered at the Royal Institution on Friday, January 29, by Dr. Dugald Clerk, F.R.S.