

THE UTILISATION OF CONDEMNED ARMY BOOTS.

THE London Section of the Society of Chemical Industry has recently established what for lack of a better term we must call a club—that is, a society of its members and their friends, who seek to combine a chastened conviviality with an interest in technical chemistry. At a meeting of the club, held on May 21, Mr. M. C. Lamb, by permission of the Director of Army Contracts, brought to the knowledge of the members the various methods that have been suggested in order to utilise the leather in condemned Army boots, and which, in the absence of proper organisation, might lead, when we have regard to the present magnitude of our Army, to an enormous waste of material of considerable intrinsic value, even after it has served its primary purpose as footwear.

Mr. Lamb's paper appears in the issue of the *Journal of the Society* for September 29, and as it affords a good illustration of what may be accomplished by the intelligent co-operation of experts and officials in dealing with a problem of special importance at the present time, a short summary of its contents may be of general interest. War is so terribly wasteful that any efforts to minimise its effects, even if they are only concerned with discarded boots, merit attention and appreciation.

It is not to be supposed that this particular problem has only just arisen. Even in peace-time the worn-out boots of "a contemptible little Army" had to be condemned. They were sold to contractors, who doubtless found means to turn them to more or less profitable account. But with millions of men under arms and in active service, the whole matter had to be dealt with in a very different fashion from that in pre-war periods, and the object of Mr. Lamb's communication was to show the results which have followed from attempts to discover means for the better utilisation of discarded footwear.

It will doubtless surprise many people to learn that waste boot leather has been found to be a good material for road-making, the scrap leather, preferably of soles (since a more profitable use can be found for the uppers), being mixed to the extent of from 5 to 10 per cent., depending upon the character of the road, with slag, granite, or limestone, in conjunction with asphalt and bitumen. It is claimed for this mixed material, which is known as "Broughite," from the name of the patentee, that it possesses the hardness and rigidity of the ordinary tar macadam road, with reduced attrition and dust and greater resilience. The method employed is to mix the scrap leather with the asphalt, bitumen, limestone, etc., lay the surface of the road with the composition, and give a top facing of slag, granite, or limestone. One ton of the tarred material is needed to cover six square yards with an application 4 in. thick, or some 89,000 pairs of discarded boots to each mile of a roadway eight yards wide. It seems a just and fitting retribution—a sort of poetical justice—that boots in their old age should be condemned to make good the roads they have trodden and worn down.

Experience has shown that "Broughite" is a cheap and satisfactory substitute for wood-paving; it possesses greater wearing qualities, and is equally silent; it costs much less than wood and no more than bituminous macadam. It affords a good grip for rubber tyres and an excellent foothold for horses. The Roads Board is making trials of its value, and several pieces of roadway have been laid down under its direction.

Waste leather makes an admirable form of *animal charcoal*. When subjected to destructive distillation leather yields about a fourth of its weight of a com-

paratively pure charcoal, which has a decolorising power, as tested on sugar syrups and gelatin, in nowise inferior to bone-char. At the same time, the distillation products afford from 23 to 25 per cent. of crude *ammonium sulphate*, suitable as a fertiliser.

The leather of boot uppers contains on an average about 15 per cent. of extractable *grease and fatty matter*, melting at about 38° C., and quite suitable for currying leather, and for other purposes in which a moderately hard low-grade grease suffices. The approximate present value of these products to be obtained from a ton, or 560 pairs, of condemned boots is rather more than 16l. 11s., of which the charcoal and ammonium sulphate are by far the more important items.

On account of its nitrogen content leather waste is regarded as possessing considerable potential value as a manure. It, however, decomposes very slowly, and requires special treatment to make it effective. Chrome-tanned material is found to be hurtful to plant-life.

Other uses for condemned military boots are in the manufacture of leather board, leather pulp and powder, clogs, washers for screw-down water-taps, mats, cyanides and prussiates, glue and size.

Evidently, as the time-honoured adage says, "there is nothing like leather," even from old boots.

THE ORGANISATION OF ENGINEERING TRAINING.

A CONFERENCE on the above subject was held at the Institution of Civil Engineers on October 25, delegates representing the chief engineering institutions and educational bodies, various Government departments, and a number of universities and technical colleges being present. Sir Maurice Fitzmaurice, president of the Institution of Civil Engineers, took the chair.

Sir Maurice Fitzmaurice, in opening the proceedings, remarked that there was a great gap between the period when a boy decided to become an engineer and when he actually entered on his training. There was general recognition that youths entering the engineering industry should receive uniformly sound training, and the proposals to be brought before the meeting related to the establishment of a central representative committee to secure better co-ordination in this matter. The council of the Institution of Civil Engineers felt that nothing but good could come of this meeting, in which all interests, educational, professional, and manufacturing, were represented.

A letter was read from Mr. H. A. L. Fisher, the President of the Board of Education, regretting his unavoidable absence from the meeting, and stating that the Board of Education would be glad to co-operate in any well-considered scheme which the engineering industry might adopt.

Mr. A. E. Berriman, one of the honorary organisers of the meeting, then gave a brief account of the origin of the movement, which was also the subject of a memorandum placed in the hands of those present. The proposal to form a central organisation for improvement in and better co-ordination of engineering training originated at an informal conference of engineers and educationists, which held several meetings at the Board of Education during the early months of 1917. It was considered desirable that in its initial stages the proposed organisation should be free from the need of Government finance, while co-operating with the Board of Education and other educational bodies. Mr. Fisher had concurred in this view. The chief objects of the organisation would include:—(1) Co-ordination in engineering training, the fostering of apprenticeship as a national institution, and promo-

tion of a wider appreciation of the value in industry of education of university rank; (2) the maintenance of a central bureau where parents and educationists can obtain accurate and comprehensive information relating to the industry, and the proper course to be pursued by boys entering it; and (3) the promotion of scholarships and other means by which the best talent may receive adequate educational opportunity.

In the ensuing discussion general approval of the proposals was expressed.

Among those who took part were Sir Dugald Clerk, Mr. Michael Longbridge (president of the Institution of Mechanical Engineers), Mr. C. H. Wordingham (president of the Institution of Electrical Engineers), Mr. W. H. Ellis (the Master Cutler), Mr. H. B. Rowell (president of the North-East Coast Institution of Engineers and Shipbuilders), Mr. R. T. Nugent (Federation of British Industries), Prof. W. E. Dabry, Lieut.-Commander C. F. Jenkin (Oxford University), Sir A. Selby Bigge (Board of Education), and Sir Wilfred Stokes (British Engineers' Association).

Finally, the following resolution was proposed by Sir John Wolfe-Barry, seconded by Dr. W. H. Hadow (principal of Armstrong College, Newcastle-upon-Tyne), supported by Mr. Arthur Dyke Acland, and carried unanimously:—"That this meeting of engineers and educationists is of the opinion that a need exists for improvement in and better co-ordination of engineering training, and considers that some form of central organisation is a desirable means to this end. It is therefore resolved that a representative committee, with powers to add to its numbers, be appointed to initiate means that will give effect to this principle of a central organisation." The first members of this committee are to be representative of twenty-six institutions and other bodies named.

Pending further developments, communications should be sent to Mr. A. Berriman (chief engineer, Daimler Co., Ltd., Coventry) or Mr. A. P. M. Fleming (British Westinghouse Electric and Manufacturing Co., Ltd., Trafford Park, Manchester), who were appointed to act as hon. organisers of the meeting.

THE OFFSPRING OF DEAF PARENTS.

WE have received from Dr. Alexander Graham Bell an interesting publication by the Volta Bureau, Washington, entitled "Graphical Studies of Marriages of the Deaf." Under Dr. Bell's direction, Mr. A. W. Clime has prepared about a hundred pages of graphical index to the marriages reported in Dr. E. A. Fay's well-known work on "Marriages of the Deaf in America," and likewise 301 pedigree charts of the marriages of the deaf that resulted in deaf offspring. Mr. F. De Land contributes two pages of introduction, which might have been expanded to great advantage. From Fay's 4471 marriages Dr. Bell has eliminated 974 in regard to which there was no information as to offspring, 419 where the marriage had taken place within a year of the date of report to Dr. Fay, and 434 that were childless when reported. The removal of these 1827 marriages left 2644 marriages of a year's standing or more, and with children.

The number of children recorded was 6782, of which 588, or 8.66 per cent., were deaf. These 588 deaf children were the offspring of only 302 of the marriages. After deducting two marriages (which resulted in three deaf children and "several" hearing children) because the total number of children born was not stated, Dr. Bell was left with 300 marriages the offspring of which were in varying proportions affected by deafness. The total number of children born was 1044; the number of deaf children among these was

585. The proportion of deaf is thus more than half, 56 per cent.

Another result worthy of note is that of the 2642 marriages considered the average number of children per marriage in the 300 marriages that resulted in deaf offspring was 3.48, while an average of only 2.44 per marriage was reported in the 2342 marriages resulting in no reported deaf offspring.

It may be recalled that in 1883 Dr. Bell presented a memoir to the National Academy of Sciences entitled "Upon the Formation of a Deaf Variety of the Human Race." His recent graphical studies clearly show that although the total percentage of families with deaf children, out of 2642 marriages where deafness marked one or both parents, was not extremely high, being about 12 per cent., the proportion of affected members of the 300 families with deaf offspring was very high, about 56 per cent.

That all the children of two deaf parents are not deaf is probably because the two parents are deaf in different ways, but Dr. Bell has in this publication refrained from any interpretations. In looking over individual cases, one is struck to see some where there was deafness in the husband and wife and in the relatives of both, but none in the children; other cases where there was deafness on both sides of the house, but only in half of the offspring; others in which there was deafness in one parent and none in the offspring; and others again in which the defect was in one parent only, but in all the offspring, or, say, in six out of seven.

One would have liked some discussion of the very interesting variety of results, which must surely mean that even after we have set aside deafness due to otosclerosis and to catarrhal weakness, the kind of deafness called deaf-mutism is not a homogeneous physiological condition. But some discussion would have been very welcome. As one looks over the charts one is struck by the rarity of the symbol which stands for "partially deaf," and the suspicion arises that it has not been sufficiently differentiated in the printing from the symbol for "deaf."

There is much obscurity in regard to the inheritance of deafness, and Dr. Bell's painstaking presentation of different family histories will enable experts to study individual cases. It must be impossible in many cases recorded to get medical opinion as to the nature of the deafness, but in the present-day accumulation of more data like Fay's an endeavour should be made to sift out varieties of deafness more radically than is involved in merely distinguishing between adventitious and congenital.

THE UTILITY OF THE USELESS.¹

FOR several reasons it is a profitable exercise to trace back a modern invention, or commercial appliance, to the fundamental discoveries from which it sprang. In the first place, the debt of commerce to pure science is thus demonstrated; for it is safe to say that none of the numerous inventions and devices which are of such immense commercial importance at the present day could have come into existence had it not been preceded by one, or possibly many discoveries arising out of research pursued in a purely academic spirit. But, as being of far more importance from the point of view of the ardent beginner in scientific research, the tracing of the germinal discoveries upon which an invention is based is of value as showing how all academic research, remote though it may appear from the service of mankind, may contain

¹ Presidential address delivered to the Royal Physical Society, Edinburgh, by Dr. O. Charnock Bradley. Reprinted from the Proceedings of the Society for March, 1917.