

capable instructors in advanced science is threatened. At present teachers of elementary science are better paid, on the average, than those engaged in the higher branches, and are additionally, in most cases, entitled to pensions under the Teachers' Superannuation Act. The obvious result of this anomalous state of things is that the ranks of higher scientific teachers will be depleted unless strong and prompt Government action is taken to place the universities and colleges on a sound financial basis. Unless this be done there is little prospect of obtaining the research workers necessary to secure the industrial future of the country.

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The Indian Rope Trick.

THE recent correspondence in the *Daily Mail* relating to the Indian rope trick is very similar to the controversies that have arisen from time to time in the Press in India, but nothing said seems to advance the evidence a jot further. The man who does the rope trick has yet to be produced!

During a considerable portion of a residence of more than thirty years in India, I studied Indian conjuring and made all the inquiries I could regarding this trick. I knew many of the best conjurers between Calcutta and Delhi, but never found one who had seen the rope trick. Several had heard of it, some believed in it, none could satisfactorily explain it.

Personally, I am of opinion that the rope trick is entirely mythical. I decline to accept the various theories put forward by amateurs in support of its practicability, such, for example, as hypnotism or substitution. The most likely explanation I have heard is that the trick is performed in a courtyard, that smoke obscures the view above, and that the rope is actually thrown up to a confederate, who fastens it to a beam which cannot be seen on account of the smoke; a lad then climbs up the rope and is similarly lost to view in the smoke, but even this theory is unlikely. It would not be impossible to arrange a scene on a stage where the rope trick could be performed as an illusion—not by a smoke screen, but by other means of hiding what happens above a certain height.

As to Indian conjuring generally, I consider it to be far behind European, though the sleight of hand is often extraordinarily good, and the methods occasionally ingenious, as, for instance, when conjurers apparently cause a few grains of wheat or gram to sprout in a few moments—a far better illusion than the over-rated mango-tree trick.

Indian conjurers are very conservative and seldom produce new tricks, and they are very slow in discovering how a trick, new to them, is done even when performed by an amateur on well-known principles.

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THE USE OF HELIUM FOR AIRCRAFT PURPOSES.

SHORTLY after the commencement of the war it became evident that if helium were available in sufficient quantities to replace hydrogen in naval and military airships, the losses in life and equipment arising from the use of hydrogen would be enormously lessened. Helium, as is known, is most suitable as a filling for airship envelopes, in that it is non-inflammable and non-explosive, and, if desired, the engines may be placed within

the envelope. By its use it is also possible to secure additional buoyancy by heating the gas (electrically or otherwise), and this fact might possibly lead to considerable modifications in the technique of airship manœuvres and navigation. The loss of gas from diffusion through the envelope is also less with helium than with hydrogen, but, on the other hand, the lifting power of helium is about 10 per cent. less than that of hydrogen.

Proposals had been frequently put forward by men of science in the British Empire and in enemy countries regarding the development of supplies of helium for airship purposes, but the first attempt to give practical effect to these proposals was initiated by Sir Richard Threlfall, who received strong support from the Admiralty through the Board of Invention and Research, under the presidency of Admiral of the Fleet Lord Fisher.

It was known that supplies of natural gas containing helium in varying amounts existed in America, and it became evident from the preliminary investigations made by Sir Richard Threlfall, and from calculations submitted by him as to cost of production, transportation, etc., that there was substantial ground for believing that helium could be obtained in large quantities at a cost which would not be prohibitive.

Prof. J. C. McLennan was invited by the Board of Invention and Research in 1915 to determine the helium content of the supplies of natural gas within the Empire, to carry out a series of experiments on a semi-commercial scale with the helium supplies available, and also to work out all technical details in connection with the large-scale production of helium and the large-scale purification of such supplies as might be delivered and become contaminated with air in service. In this work Prof. McLennan received assistance from his colleagues, Profs. John Satterly, E. F. Burton, H. F. Dawes, Capt. McTaggart, and Mr. John Patterson.

In the course of their investigations, which were carried out with the co-operation of L'Air Liquide Co., it was found that large supplies of helium were available in Canada, which could be produced at a cost of about one shilling per cubic foot.

In the summer of 1917, when the United States of America had decided to enter the war on the side of the Allies, and after the investigations referred to above were well under way, proposals were made to the Navy and Army and to the National Research Council of the U.S.A. to co-operate by developing the supplies of helium available in the United States. These were made, on behalf of the Admiralty, through the Board of Invention and Research by Sir Ernest Rutherford and a special Commission consisting of Commander Bridge, R.N., Lt.-Col. Lowcock, and Prof. John Satterly.

The authorities cited agreed to co-operate with vigour in supporting these proposals, and large orders were at once placed by them with the Air Reduction Co. and the Lynde Co. for plant, equipment, cylinders, etc. The Bureau of Mines also