

Two other consequences have issued from the increased use of machinery. The first is the ousting of the small works and the concentration of production to an increasing degree in fewer but larger factories (the number of window glass works, for example, in the United States fell from 79 in 1919 to 18 in 1933). A second result has been a rapid world-wide spread of the industry, for the recent growth in many additional countries, of which Japan is an outstanding example, would not have been possible if it had depended on a supply of skilled glass-blowers.

With the development of machine production, and indeed rendered necessary by it, there has been a corresponding improvement in furnaces and refractory materials, in feeding devices for molten glass, and in lehrs for annealing the finished product.

In the striking advance here so admirably illustrated, the chemist and physicist, in addition to the engineer, have played a decisive part. To them has fallen such tasks as providing purer and more varied supplies of raw materials in ever-increasing quantities, and exploring the relationships between the chemical composition and chemical and physical properties of glasses so that a material most suitable for each type of production might be obtained. But the attention of the technologist has been by no means confined to the field of mass production, and a number of fresh developments in various fields during recent years testify to his industry. Among them may be cited 'Vita' glass, Safety glasses, Pyrex glass, Vitrolite, glass building bricks and modern glass wool or silk.

These and other advances in the art and science of glass-making have been reflected in the marked growth of technical training and research institutions and in the copious output of valuable literature, of which the *Journal of the Society of Glass Technology* is a striking example.

Science News a Century Ago

Debate on Civil List Pensions

In the House of Commons on December 19, 1837, Mr. Rice, the Chancellor of the Exchequer, moved that the Civil List Bill be read a third time. To this, Mr. Grote, the historian, then M.P. for the City of London, replied by moving an amendment that the clause empowering Her Majesty to grant a certain sum (£1,200) annually should be struck out. He maintained that pensions ought no longer to be assigned at the mere arbitrary and irresponsible will of the Sovereign. The proper distribution of these involved a great public duty, and the House should take them under its control.

Sir Robert Peel, speaking against the amendment, said that the sum of £1,200 as a provision for the United Kingdom was too limited. The honorable gentleman [Mr. Grote] would do away with pensions altogether, but cases would arise—cases where it would be proved that men of science had devoted the energies of their minds and fortunes for the benefit of society, and then the country would revolt against the niggardly conduct of Parliament. A pension and an honorary dignity were on the same principle awarded by the Crown. Literary and scientific men should, in his opinion, receive pensions if they stood in need of them; if not, they should receive those conventional distinctions, which the Crown alone should have the power of conferring. Mr. Buller, the member for Liskeard, who agreed in

the main with Sir Robert Peel, said it was almost impossible to point out one instance of a person who had benefited his posterity either by his writings or his advancement of science, from the time of Chaucer to the present day, who had not been supported by either the bounty of the Crown or the charity of some individual.

In the course of the debate, references were made to Locke, Johnson, Southey, Wordsworth, Coleridge, Dalton, Wollaston, Airy and Mrs. Somerville. Mr. Buller also referred to the case of "Mr. Wallace, who had been for many years Professor of mathematics at Edinburgh, and who was second only to Ivory in his talents or attainments, and yet when he applied for a pension he was refused: he considered this a cruel case." Mr. Grote's amendment was lost by 23 votes to 125.

Faraday's Experimental Researches

At a meeting of the Royal Society on December 21, 1837, Faraday continued the reading of his "Experimental Researches in Electricity", Eleventh Series. The reading of the paper had been begun on December 14 and its concluding portion was read on January 11, 1838. The official abstract said: "The object of this paper is to establish two general principles relating to the theory of electricity, which appear to be of great importance: first, that induction is in all cases the result of the actions of contiguous particles; and secondly, that different insulators have different inductive capacities. . . . In conclusion, the author remarks, that induction appears to be essentially an action of contiguous particles, through the intermediation of which the electric force originating or appearing at a certain place, is propagated to or sustained at a distance, appearing there as a force of the same kind and exactly equal in amount, but opposite in its direction and tendencies. Induction requires no sensible thickness in the conductors which may be used to limit its extent. . . . But with regard to dielectric or insulating media, the results are very different; for their thickness has an immediate and important influence in the degree of induction. As to their quality, though all gases and vapours are alike, whatever be their state, amongst solid bodies, and between them and gases, there are differences which prove the existence of specific inductive capacity."

Naturalists in Abyssinia

"FRENCH and German naturalists," said the *Athenæum* of December 23, 1837, "are overrunning Abyssinia in all directions. Letters have just been received from Schimper, who was sent by the Württemberg Naturalists' Society, to Africa. After sending home a collection of plants from the Hedjas and Mount Sinai, he arrived at Massawa in January, where great obstacles were raised to his prosecuting his journey, by the recent circumstance of two French travellers having been killed in Abyssinia. However, he succeeded in reaching Arkiko and Haley, and thence sent on to the Abyssinian King Wabeah, who was encamped at Hazabo, between Adowa and Axum, for permission and safe conduct. This was granted, and he was soon welcomed at Adowa, the king's capital, by the German missionaries, sent from England; Blumhardt and Isenberg. From thence he intends to prosecute his scientific tour to the Abyssinian Alps." Wilhelm Schimper was born in Mannheim in 1804 and died at Adowa in 1878.