

gress is reported on the study of the power losses of various components of axial piston pumps and motors, and methods of designing hydrostatic slipper pads, pistons and valve plates; means have been devised to minimize the sum of the viscous-drag and flow-leakage losses. A large-scale model study has commenced involving the flow of water, ash and air, of an open channel installation designed for the rapid discharge of a railway train of ash wagons. The work on ejectors has been extended to include those in which both the driving and entrained fluids are compressible, and a programme has been written for the digital computation of initial downsurge at pump shutdown. Problems in the design of power stations which have been investigated relate to cooling-water systems and the ventilation of boiler-houses. A list of publications during the year is included, and application in advance for invitation to visit the Laboratory on the afternoons of September 11 and 12, when exhibits illustrating most phases of the Association's work will be shown, is invited from those interested.

### The Lace Research Association

THE fourteenth annual report of the Lace Research Association for 1962 records that sixteen machines fitted with the beam thread-break indicator are now in regular use (Pp. 30. Bilborough, Nottingham: Lace Research Association, 1963). Moreover, although the prototype of a new device traversing the facing bar of the Leavers machine to detect holes caused through broken threads worked well, improvements made or in hand include a better driving system for the scanning head, facilities for increasing the number of scanning heads, and a means for pre-selecting the length of hole which will trip the warning signal. Measurements have been made of the various features relating to gap widths and packing density in brass-bobbin winding, and a technique of 'potting' bobbins with synthetic resin has been evolved which allows the bobbin to be radially sectioned without disturbing the lie of the yarns. Photographic techniques have been examined which are aimed at producing points at about 200 times magnification, so that individual filaments in the yarn can be counted, and thus the packing density in the bobbins checked. Considerable advance is reported in the project to mechanize the 'clipping' process in lace finishing and several different types of scalloping machine have been examined as to their suitability for scalloping Leavers lace. Small amounts of triallyl phosphate have been attached to cellulose by graft polymerization, but the flame-proofing achieved was insufficient to bring cotton net into the 'fabric of low-flammability' category. Trials of sodium borohydride as a bleaching agent showed that when used on cotton after hypochlorite bleaching improved fluidity figures are obtained, and it was also useful in cleaning heat-discoloured nylon. A report has been presented to the Council on recent work on lubrication.

### Petroleum Consumption in the United Kingdom, 1962

FIGURES released by the Petroleum Information Bureau on behalf of the United Kingdom Petroleum Industry Advisory Committee in May 1963 reveal that demand for petroleum products in the United Kingdom in 1962 was 10.6 per cent higher than in 1961 (*U.K. Petroleum Industry Statistics: Consumption and Refinery Production, 1961 and 1962*. Pp. 8. London: Petroleum Information Bureau, 1963). If bunkering for ships engaged in foreign trade be excluded, total deliveries into consumption of all petroleum products amounted to 50,900,433 tons as against 46,014,950 tons in 1961. Consumption of motor spirit increased by 5.2 per cent, deliveries to dealers being 7 per cent up while those to commercial consumers dropped by 3.5 per cent, reflecting the continual change-over from petrol to diesel-engined commercial vehicles. Deliveries of DERV (diesel-engined road vehicle) fuel actually increased during the year by

7.1 per cent. The average temperature in 1962 was some 2° F below that of 1961 and to this fact is ascribed the considerable increase in demand for the 'black oils', gas/Diesel oil deliveries rising by 17 per cent, fuel oil by 13.4 per cent compared with the previous year. This weather factor also led to an increase in consumption of burning oil, which showed an increase of 16.3 per cent, due largely to the growing popularity of oil-fired central heating, which represented more than 50 per cent compared with 1961, also of free-standing space heaters the demands of which rose by 12.7 per cent. In agricultural operations, Diesel-engined tractors are steadily replacing the less efficient vaporizing-oil type, and this process is reflected in the decline of vaporizing-oil deliveries by 18.7 per cent. Regarding aviation fuel consumption, there was a slight decrease of 2.2 per cent compared with 1961; of a total of 2,108,348 tons, approximately nine-tenths of this comprised aviation turbine fuels, demand for which in 1962 amounted to 1,886,420 tons as compared with 221,928 tons for aviation spirit. Recession in industry and shipping, which account for nearly 60 per cent of all lubricants sold, was reflected in the lower demand for lubricating oils and greases, a decrease of 1.2 per cent compared with the 1961 figure. The use of liquid gases, propane and butane, by Gas Boards and industry is shown by the remarkable growth-rate of 42.6 per cent, deliveries being 294,163 tons compared with 206,285 tons in 1961. Finally, as might well be expected having regard to the phenomenal expansion of the petrochemicals industry, petroleum chemical feedstock deliveries were up by 23.5 per cent, 1,948,861 tons, compared with 1961.

### Stable Isotopes of Oxygen

HIGH enrichments of both stable isotopes of oxygen have recently been achieved. Up to 99 atomic per cent of oxygen-18 has been available for some time in various chemical forms and has already been widely used in chemistry and biology as a tracer and as both target and projectile in nuclear studies. Oxygen-18 labelled compounds also have great potentialities in studies of isotope effects and spectral isotopic shifts. Oxygen-17 with a spin of 5/2 is the only isotope of oxygen which can be used for nuclear magnetic and electron spin resonance investigations. Enrichments of more than 10 atomic per cent oxygen-17 in water and 50 atomic per cent oxygen-17 in oxygen gas have recently been reached on a production scale in the Isotope Separation Plant of the Weizmann Institute of Science. These concentrations represent a 250-fold enrichment of oxygen-17 in water and 1,350-fold enrichment in oxygen gas. These materials are now available through YEDA Research and Development Co., Rehovoth, Israel. A booklet containing some pertinent references and a catalogue of materials enriched by oxygen-18 and oxygen-17 can be obtained from that Company.

### Organ Pipes

CENTURIES of organ building have firmly established a preference for alloys of tin and lead as the best material for organ pipes, though in recent years to save cost zinc has been used with a sacrifice of some tonal quality. Acoustic research in the Physikalisch-Technische Bundesanstalt at Brunswick, by Drs. W. Lottermoser and J. Meyer, using pipes of 'lead' (lead 70 per cent, tin 30 per cent), 'tin' (tin 70 per cent, lead 30 per cent), copper, both electrolytic and fire-refined zinc and pine wood, has confirmed this distinctive acoustic characteristic of the different pipe materials, determined mainly by their damping properties. From the musical point of view, organ pipes should radiate harmonic tones uniformly in all directions and emit a minimum of discordant sounds due to eddies set up by the jet of air issuing between the tongue and lip. These cause not only strong whistling sounds—especially noticeable at the instant that the