THE HOSPITAL ENGINEER

THE JOURNAL OF THE INSTITUTION OF HOSPITAL ENGINEERS

Vol XIV: No 10
October 1960

Editorial

AVERAGE savings of 20% of fuel consumption can readily be made, says Sir Leslie Hollinghurst in the 6th Progress Survey of N.I.F.E.S. This has been shown by the results achieved, for the most part, by better operation and maintenance of existing plant. In industry, improvement of existing plant has often made the purchase of new plant unnecessary though, we think, this is unlikely to produce a parallel in the hospital world where too much of the equipment is obsolete.

Reverting to the report, however, several interesting points emerge. Firstly, in spite of the engineering staff being some 14% smaller than the previous year, the amount of work carried out, including the signing of regular service agreements, has again increased substantially, showing that the benefit is substantial. Secondly, the work of N.I.F.E.S. continues to extend into new fields and some of these merit particular attention.

It is shown, for instance, that water economy is more closely linked with fuel efficiency than would appear at first sight. Quoting an industrial example, the report says—". . . at one factory where separate supplies of water were being employed in different sections, N.I.F.E.S. engineers proposed that the water should be re-used progressively through the cooling plants and, ultimately, in the processing. . . . River water, at a temperature of 61°F. in summer, is now softened and used as the cooling medium in a solvent recovery plant. Thence, it passes at 67°F. to a storage tank from which the cooling water for the condensers on the refrigeration plant is circulated. As a result, the temperature is raised to 75°F. and the water then supplies the process machines. Thus, not only has demand for the water been reduced, but 8,000 gallons an hour that require to be heated have been raised in temperature by 14°F.; this represents a fuel saving of nearly ten tons a week." Further economies have been effected by increasing pipe diameters to reduce pumping costs and to allow water to flow by gravity wherever possible.

Surveys have been undertaken of over 200 laundries and have resulted in mean savings of 18·2% of consumption. Even greater reductions have been made on individual processes as follows: On washing machines, heat recovery from hot effluent, automatic controls, the improvement of loading, and prevention of leaks, reduced steam consumption by 23%; on tumbler driers, the recirculation of air, with temperature control, reduced the steam required by 38%; full loading of calenders, prevention of steam leaks and flash steam recovery, saved 21% of steam, and the same attention to presses coupled with thermal insulation, and attention to steam traps, saved 24%.

We know that operation of hospital plant is a very different problem from that upon which N.I.F.E.S. engineers practise most of their magic, but it makes interesting material for consideration.

The Use of Plastics in Engineering

By L. H. COBB*
B.Sc., A.R.C.S., D.I.C., Ph.D.

The Plastics Industry today is of considerable size and complexity. The use of certain plastic materials in hospitals has previously been discussed in these pages. This article covers the engineering use of plastics on a broader basis and appears in two parts.

Range of Plastics Materials

A CURRENT directory of plastics materials will include at least forty distinct chemical types of plastics materials, but such a number will be far from complete if account is taken of all the chemical variations of the older types and all the new types which are being produced on a development scale and this is hardly surprising since new plastics are being announced throughout the world almost every day. Some of these developed recently, such as polypropylene, polycarbonate, polyformaldehyde, polyethylene terephthalate film and copolymers of perfluoropropylene and vinylidene fluoride, to quote the chemical names of just a few, are already of commercial significance and obviously destined to become more so in their particular fields of use.

In addition, there are often more subtle variations within a chemical type, in some cases leading to a family of related materials, but with properties which may differ significantly in some directions. This is well illustrated by polythene, where up to a few years ago, the design engineer knew more or less where he stood if one spoke of just polythene. This is no longer so since, following the discovery of new polymerisation techniques, it is possible to produce polythenes with more regular molecules which lead to significant differences in properties, and also affect density. Terms such as low density, medium density and high density are now used to define broadly the types of polythenes available and, whilst some of their properties are similar, differences in others cannot be neglected by any means. For example, articles made from low density polythene cannot be heat sterilised, whilst those made from the higher density polythenes can be boiled and they are also several times stiffer at ordinary temperatures than similar articles made from low density polythene. The more recent related development of polypropylene of still higher temperature resistance and stiffness, and of various copolymers of ethylene, extends further the range of polyolefine plastics materials which confront the design engineer today.

The variety of plastics materials is increased still further due to the fact that many basic resins or polymers of a particular type are offered in various forms and grades. These forms and grades generally include a range of moulding and extrusion compounds which may contain besides colouring matter, additives such as fillers, plasticisers and stabilisers of various types, the proportion and nature of which can markedly affect properties. Some plastics materials are available in other forms such as dispersions, pastes and solutions and in a number of grades to suit different processing needs, such as impregnation, spreading, casting, bonding and surface coating. Finally, with most plastics materials, wrought products such as film, sheet, rod, tube, filament and foams, are also made for use as such, or for further conversion.

It may seem surprising that so many different chemical types, forms and grades of plastics materials are being produced. However, no one plastics material has all the virtues, and the rapid growth in the number and size of applications has given scope for an increasing variety of plastics materials with specific properties. Although some are made on a larger scale than others, most of them have at least some applications in engineering.

Size of the Plastics Industry

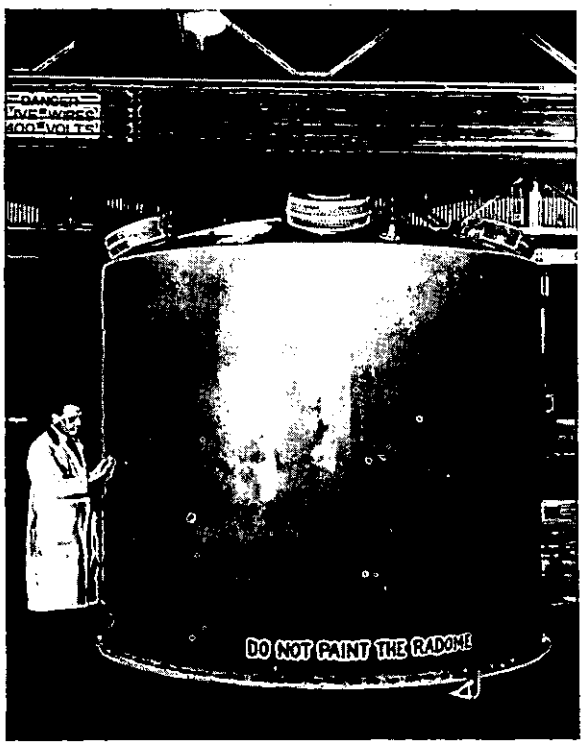
The size of an industry can be measured by several yard-sticks, but a few production figures help to put the industry in perspective. World production of primary plastics materials in 1959 was probably about 4½–5 million tons, of which about 2½ million tons were made in the United States and ½ million tons in this country. The U.K. production figure, which is still increasing rapidly, is now about three and a half times as large as it was ten years ago and around one and a half times the U.K. production of wrought aluminium. On a volume basis, the U.K. consumption of plastics materials is greater than that of aluminium and copper combined.

It is difficult to make an estimate of the tonnage of plastics materials used in engineering applications in this country, but there is no doubt that the bulk of plastics materials end up in industrial applications and that a large proportion of these can be regarded as engineering ones. One estimate puts the U.K. usage of plastics in engineering applications at about

---

A paper read before the Midland Branch of the Institution.

*Imperial Chemical Industries Limited, Midland Region.



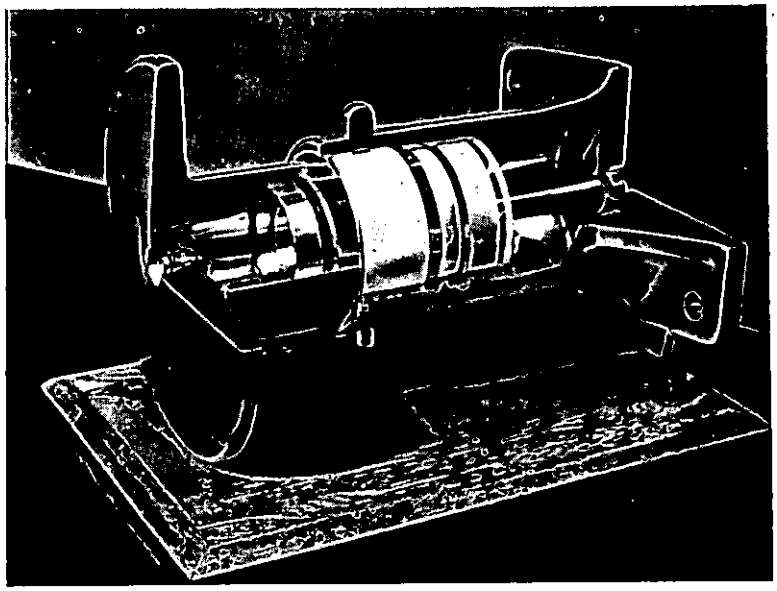
Aerial housing made by Marston Excelsior Ltd. in self-coloured glass fibre laminate.

170,000 tons/year, or about 50% of the U.K. consumption for all purposes. However, whatever the precise figure may be, it is clear that plastics materials are making a very important contribution to engineering industries.

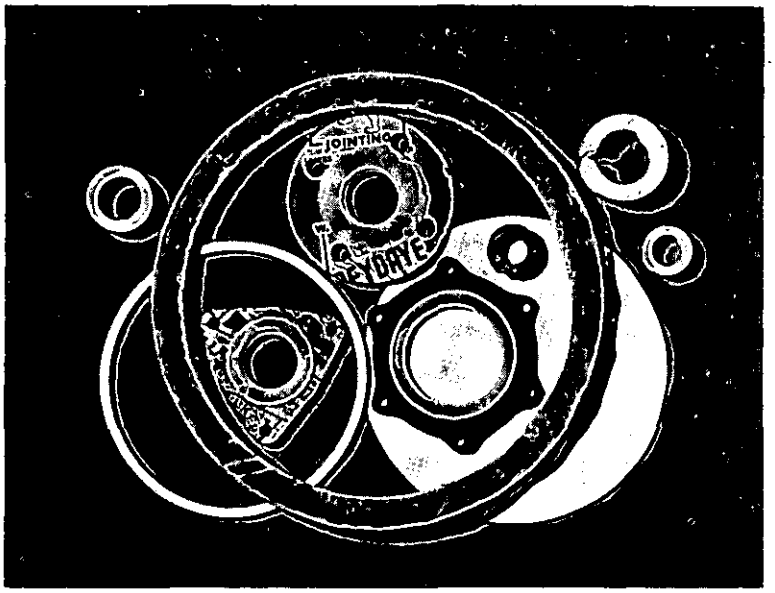
Range of Engineering Applications

Before describing some typical engineering applications of plastics materials it is useful to refer to a few of the more unusual ones, in order to illustrate how broad the range is and to show how plastics can find applications even in rather unexpected places right through engineering from A to Z. One can indeed start right at the beginning of much of the engineering industry—the production of steel, or go further back to the mining of coal, or even before this, to the prospecting of new coal and iron ore deposits, where, for example, polyester film, made from polyethylene terephthalate, has an interesting application. Although plastics films might not be expected to have any direct uses in heavy mechanical engineering, polyester film is an exceptionally strong one and it is being used in 0·0075–0·010 in. thickness as a tough highly abrasion resistant lining of drill barrels used when prospecting for coal and other materials. This allows ejection of the test core already wrapped in the film, so that it can be transported and examined without disturbing the strata, which are often of a friable nature. Another film, although less strong, made from polyvinyl chloride (p.v.c.), is being used in the form of long narrow bags filled with water as a safer alternative to clay in explosion stemming during coal mining operations. P.v.c. coated conveyor belts have been established for use in coal mines for some time now.

Polytetrafluoroethylene, often called p.t.f.e. for short, is another interesting plastics material which has many exceptional properties, including a working temperature range of about —200°C. to +250°C. Above about 300°C. it starts decomposing straight from the solid into gaseous carbon-fluorine products, without melting or charring and this property is



Section of railway buffer made by Oleo Pneumatics Ltd., showing "Maranyl" I.C.I. nylon bearings and seals.



Packings, gaskets and U-rings made by James Walker & Company Ltd. using "Fluon" I.C.I. p.t.f.e.

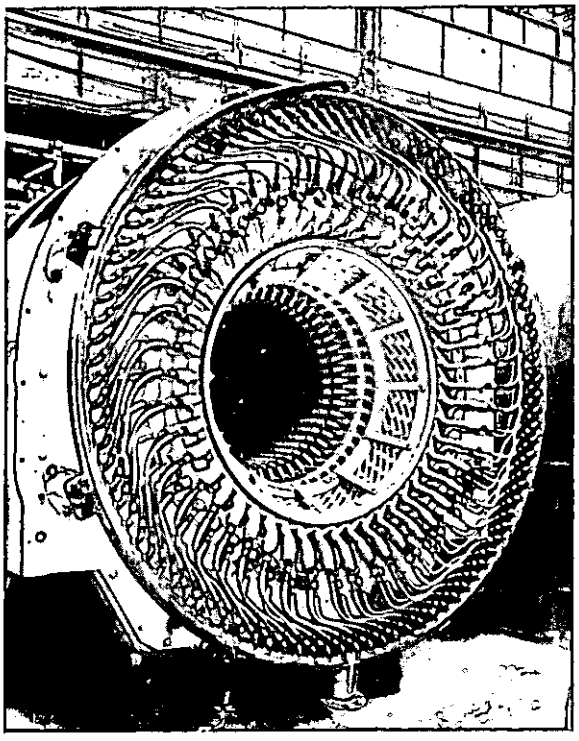
exploited in the actual making of steel. A small quantity of the plastic placed in the molten steel in the ladle has been found to improve the quality of certain alloy steels. Incidentally, the same plastic will probably be found in the oxygen installations at steel works, since it is one of the few materials retaining resiliency at liquid gas temperatures, and on this account finds application as gaskets and seals in liquid oxygen valves and pumps.

Further along the line of engineering, it might be thought that very heavy machinery would be an unlikely place to find plastics materials. However, plastics bearings made from phenol formaldehyde laminate are used in steel mills and on shafts of ships' propellers and rudders. They outlast conventional bearings many times and also may be lubricated with water—a big advantage in marine applications. Such bearings were used, for example, on the rudder and propeller shafts of the "Canberra,"[1] recently launched at Belfast and also on the rudder of "Savannah," the world's first nuclear merchant ship.[2] Very heavy gears, up to at least 5 ft. in diameter, have also been made from this material. Other examples of heavy duty mechanical applications of plastics materials, where their corrosion resistance is also exploited, are moulded nylon propellers of small ships and boats and chain made from glass filled polyester resin. These chains are said to have a strength of 65%–90% of steel chains and, besides being corrosion resistant, are comparatively light in weight.[3]

A novel use of plastics materials in the light engineering field is in the new Winchester-Weston semi-automatic shotgun. Although moulded nylon stocks are used on some rifles, this new shotgun has a plastic gun-barrel! The barrel is actually a very thin steel tube, reinforced on the outside by a glass filled epoxy resin. A stronger, lighter and cheaper gun-barrel which does not heat up on rapid firing has been achieved in this way.[4]

Finally, an example of an extreme use of plastics materials is provided by one of the most recent fields of engineering, rockets and missiles. Whilst plastics decompose at relatively low temperatures, they are also very poor conductors of heat and for this reason, some of them, such as ceramic and asbestos reinforced phenolic and other resins, can withstand temperatures of many thousands of degrees for short periods and are thus very useful for nose cones and combustion chamber liners of rockets and missiles.

Of course, many engineering uses of plastics materials are less spectacular than the brief selection mentioned above, but such examples will give some idea of how wide the field of use is, and will help to show that every type of engineer needs to consider what can be done with these materials in his particular sphere. At the same time, it should be stressed that plastics materials have their limitations and will not do all that metals or other materials will do, and care has to be taken not to mis-apply plastics or to use them without sufficient attention to design. This implies a good knowledge of the properties of plastics materials and techniques of working with them, and firms in the trade are only too willing to help with available information and advice. It is necessary to say available information, since some plastics materials are of relatively recent development and there has not been enough time to accumulate all the property information and other data relating to all conditions of use, and particularly long term use, in respect of



Water cooled stator made by A.E.I. Turbine Generator Division for Central Electricity Authority, showing "Fluon" I.C.I. p.t.f.e. hose assemblies.

which accelerated tests can often only give a guide to performance. Sometimes, therefore, it is desirable to make a prototype to check anticipated performance under actual service conditions and this can usually be easily done.

Properties of Plastics Materials

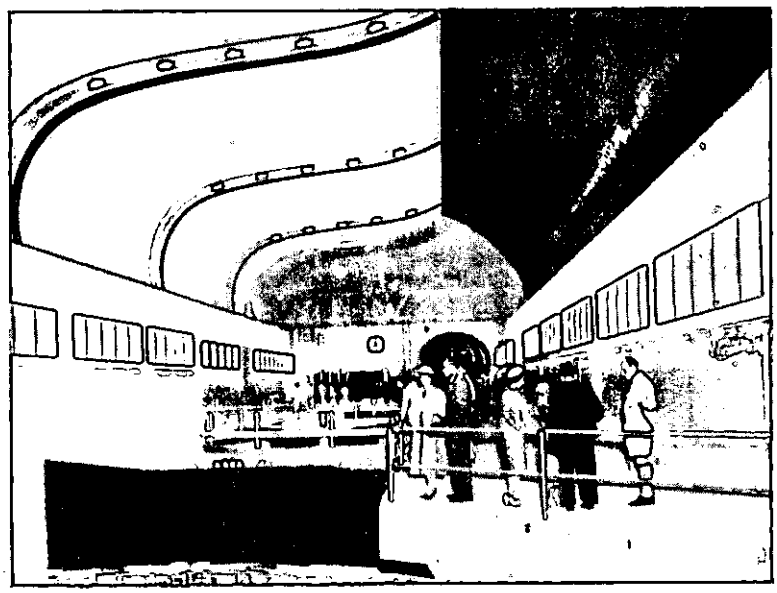
It is not possible here to go into the properties of individual plastics materials in any detail, but some of their more important characteristics should be mentioned in order to underline their chief advantages and limitations.

The properties in which plastics materials chiefly excel, when compared with other materials, are given first.

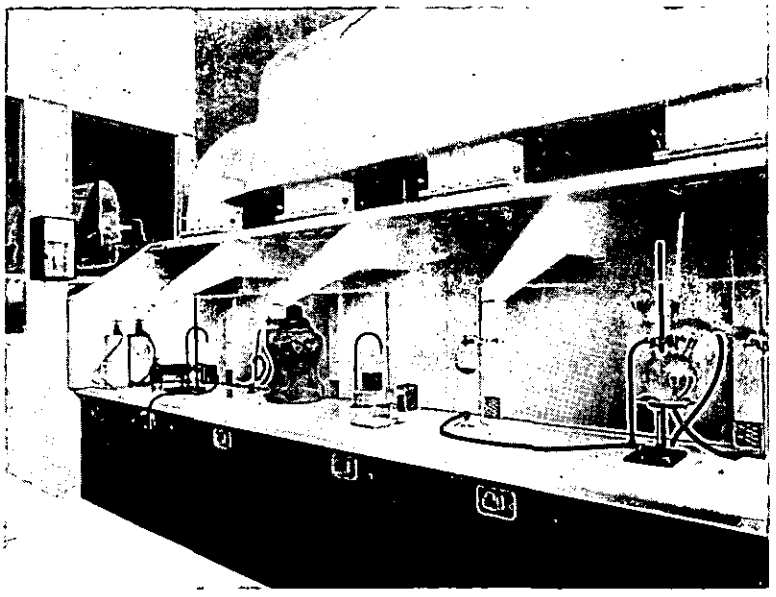
1. *General Properties*

Plastics materials are light in weight: specific gravities are low—in the range 0·9–2·5. When foamed, much lower specific gravities down to about 0·015 are achieved. Most plastics materials can be moulded to produce, with virtually no wastage, articles of complicated shape requiring little or no finishing. It is important to bear these facts in mind when considering the relative cost of components in plastics and other materials such as metals. For example, consider a gear moulded in nylon. The cost of nylon moulding powder is, on a weight basis, about five times that of brass, but the specific gravity of brass is about eight times that of nylon, so on a volume basis nylon is the cheaper material. On long runs, the conversion cost in nylon will also be less than in brass, since with the latter it is necessary to first stamp a blank and then machine the teeth, with consequent production of scrap; whereas nylon can be moulded from the powder into the finished gear in one operation on automatic machinery, with no wastage.

Plastics materials also offer a wide choice of colour possibilities ranging from highly trans-



Inside view of Kariba Dam Power Station, Southern Rhodesia. Blue "Darvic" I.C.I. p.v.c. sheet, corrugated by Rediweld Ltd., was used as a corrosion resistant roof lining. Consulting Engineers: Sir Alexander Gibb & Partners.



Fume extraction canopy installed at Ferranti Ltd. The canopy is faced with "Perspex" I.C.I. acrylic sheet, while cantilever supports and ducting were made from "Darvic" I.C.I. p.v.c. sheet by Tanks and Linings Ltd.

parent through translucent to opaque colours. Their built-in colours are more durable than the paint which often has to be applied at additional cost to articles made from materials such as metal and wood.

2. *Electrical Properties*

All plastics materials are good insulators and some are excellent. Volume resistivities range from 10^8 to $>10^{19}$ ohm-centimetre, whilst breakdown voltages range from about 200 volts/·001 in. to several thousand volts/·001 in. Some, such as polythene, have very low power factors (tan. δ) down to less than 0·0001 and are, therefore, excellent for use at high frequencies.

3. *Chemical Resistance*

Plastics materials are corrosion resistant in the ordinary sense, but vary in resistance to attack by acids, alkalis and organic liquids. Most plastics materials have comparatively good resistance to acids and alkalis and some, such as p.v.c. and polythene, are excellent in this respect and for this reason are widely used in chemical plants.

On the other hand, many plastics materials, including polythene and p.v.c., are dissolved or swelled by some common organic liquids, such as benzene and trichloroethylene, although here again there are exceptions, and nylon, for example, has excellent all round solvent resistance. The peak of chemical resistance amongst plastics is held by p.t.f.e., which is not affected by any chemical except, under certain conditions, alkali metals, fluorine and one or two highly reactive compounds of the latter element.

Properties in which plastics materials are deficient in some respects compared, say, with metals, are principally the following.

1. *Thermal Properties*

One of the important limitations of plastics materials is a relatively low upper temperature of use. Plastics materials can be divided into thermoplastic types which soften and ultimately melt on heating, and thermosetting types, which after initial processing are infusable, but which on raising the temperature eventually decompose and char. The gradual softening of thermoplastics on heating, coupled with mechanical requirements in use, limits many of them to temperatures of no more than around 60°C., whilst most thermosets are rated between about 70°C. and 150°C. for continuous operation.

In both classes, however, there are some materials which carry these limits appreciably higher. For example, amongst the thermoplastics, nylon still has quite good mechanical properties up to about 135°C., although at temperatures as high as this it will tend to oxidise and embrittle on prolonged exposure to air, whilst p.t.f.e. is quite stable up to 250°C. and, moreover, can be continuously used at this temperature in all chemical environments apart from the rare exceptions already mentioned.

Research chemists have, of course, been very busy trying to discover plastics materials of still higher temperature resistance and it appears on theoretical grounds that the best chance of achieving a heat resistance much above 300°C. lies with inorganic polymers, which are still in the

research or development stage. For example, products based on phosphonitrilic polymers are reported to have a useful life at temperatures approaching 500°C.[5] There have also been recent announcements of plastics materials—presumably inorganic—on the drawing board or under development, for which a heat resistance of 1,000°C. is claimed.[6] More may be heard about such materials in the future, but it does not necessarily follow that their other properties and price will be such to make them of general rather than of specialised interest.

On the low temperature side, limitations are not usually serious, although there is a general tendency for plastics to become stiffer and more brittle as temperature is reduced. Many, however, retain quite good properties at well below sub-zero temperatures whilst p.t.f.e. and polyethylene terephthalate film still retain some flexibility at —183°C. and can be used in certain applications even at much lower temperatures.

2. *Mechanical Properties*

The mechanical properties of plastics materials vary very considerably according to type and grade and it should not be forgotten that there are many applications where, say, flexibility rather than rigidity is required. Thus we do not want a rigid raincoat, cable or gasket, whilst polythene washing-up bowls and similar utensils which do not dent and are virtually unbreakable, have much to commend them.

As load bearing materials, however, plastics are generally inferior to metals and building materials, particularly in stiffness. In addition, mechanical properties are often very dependent on temperature and under high load some plastics are subject to creep and cold flow. Further, mechanical properties of plastics materials also tend to vary with rate of applied load and for such reasons these properties are difficult to state precisely without relation to conditions of test. However, at ordinary temperatures the modulus of most of them lies in the range of 1,000–2,000,000 lb./sq. in. whilst tensile strengths are usually between 1,000 and 10,000 lb./sq. in. In the case of certain plastics materials, it is possible to increase tensile strength very considerably by a mechanical drawing process, which can be particularly applied to forms such as filaments and films of small uniform cross section. For example, in drawn nylon monofilaments, a tensile strength of about 80,000 lb./sq. in. is achieved, whilst in bi-axially stretched polyethylene terephthalate film the tensile strength is about 26,000 lb./sq. in.

Mechanical properties can also be considerably upgraded in suitable cases by the incorporation of fillers and particularly glass fibres, which in glass fibre laminates leads to tensile strengths of up to around 50,000 lb./sq. in. and moduli of up to 3,000,000 lb./sq. in. Thus, whilst tensile strengths approaching that of mild steel can be achieved in plastics materials, even with fibreglass laminates it is only possible to obtain stiffnesses of the order of one tenth of that of mild steel and about one third that of brass. However, when considering mechanical properties of plastics, their low specific gravity should not be forgotten, since in many applications it is the strength and stiffness in relation to weight that is important and the specific strength of several plastics exceed that of some common metals.

3. *Tolerances*

It is not usually possible to achieve in finished plastics the same order of tolerances which are customary in metals. Firstly, moulded and extruded components can rarely be held to better tolerances than 0·001–0·002 in./in. Secondly, there is usually little point in trying to better this, owing to the high coefficient of expansion of plastics materials, which ranges up to about nine times that of metals, whilst changes in humidity have an even greater effect on dimensions of some plastics materials. These dimensional variations can sometimes be troublesome in structures containing both metal and plastics components, but are compensated in some degree by the greater resiliency of plastics materials, and any residual difficulties can usually be overcome by suitable design.

Summing up plastics materials very briefly from the engineer's point of view, there are a very large number of types and grades of plastics materials of which, in this country, possibly over 150,000 tons/year are being used in a very wide range of engineering type applications. The range of properties of these plastics materials is also very wide, offering advantages of economic fabrication methods, light weight, good electrical properties and chemical resistance, combined with virtually unlimited colour possibilities. On the other hand, the relatively low upper working temperature and stiffness of plastics materials at present commercially available are severe limitations in some major engineering fields.

(To be continued)

NEW HADLEY APPOINTMENT

The creation of a new post—that of technical field engineer—is announced by Hadley Telephone & Sound Systems Ltd., of Smethwick, Staffs.

The appointment is filled by the promotion of Mr. S. B. Gibson, who has been with the company for 20 years, latterly as service manager. In his new position he will be responsible for visiting all existing and future Hadley installations, maintaining contact with customers and acting as personal ambassador for Mr. Vernon Hadley, the company's managing director.

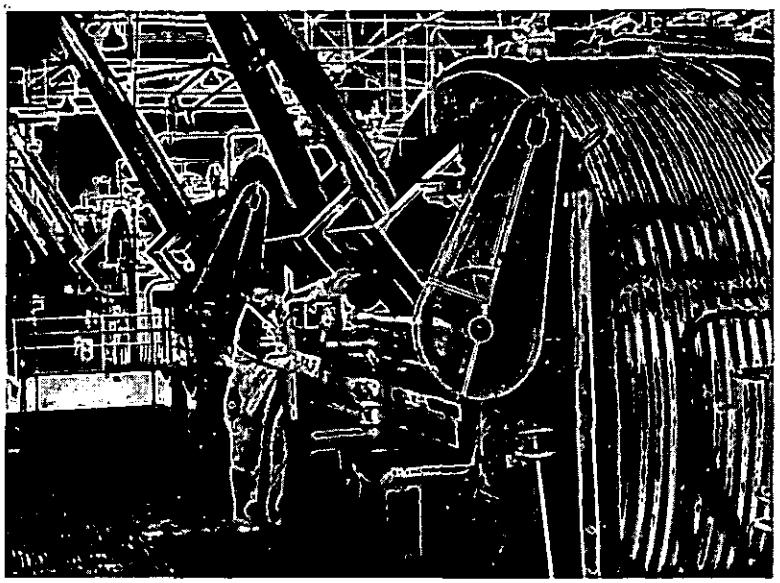


Fig. 1. General arrangement of boilers showing coal feed and raised firing platform.

Auto Control further increases Boiler House Efficiency

THE economic advantages derived from the installation of automatic boiler controls invariably result from vastly improved fuel combustion conditions, engineered by critical control of fuel and air feeds. This particular example, however, offers an interesting deviation from normal inasmuch as higher than average figures were already being obtained before the installation of the automatic system.

As might be expected, the boiler house at the Rolls-Royce engine factory in East Kilbride industrial estate, Scotland, reflects the aura of engineering excellence which surrounds the name of Rolls-Royce. Six Wilson Super Economic boilers, rated at 15,000 p.p.h. at 150 p.s.i. are arranged in two groups of three and sited so as to provide near perfect working conditions (see Fig. 1).

Opened by the Rt. Hon. Duncan Sandys as Minister of Supply in November 1953, the installation was initially designed to meet an estimated peak working load of 60/70,000 p.p.h. Each group of three boilers supplies two steam headers, one for process and the larger (12 inch) for space heating, provision being made for coupling the two headers.

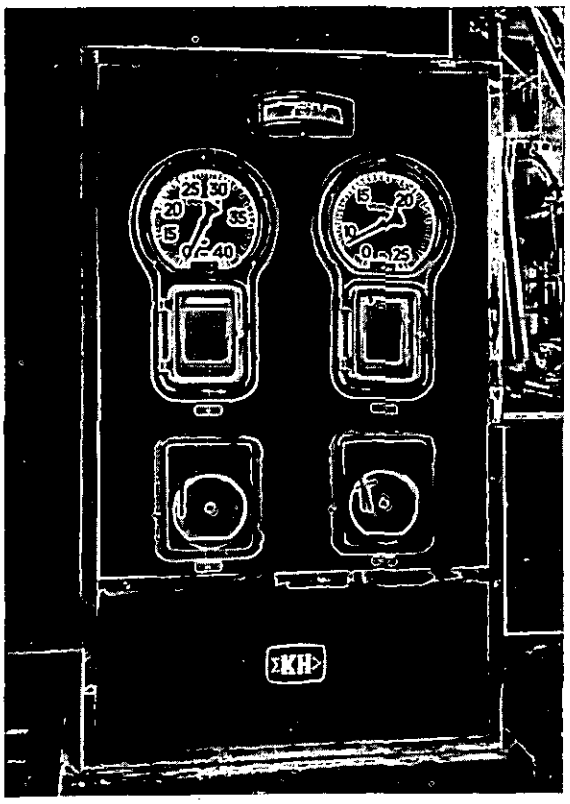


Fig. 2. Integrating panel situated in Superintendent's office.

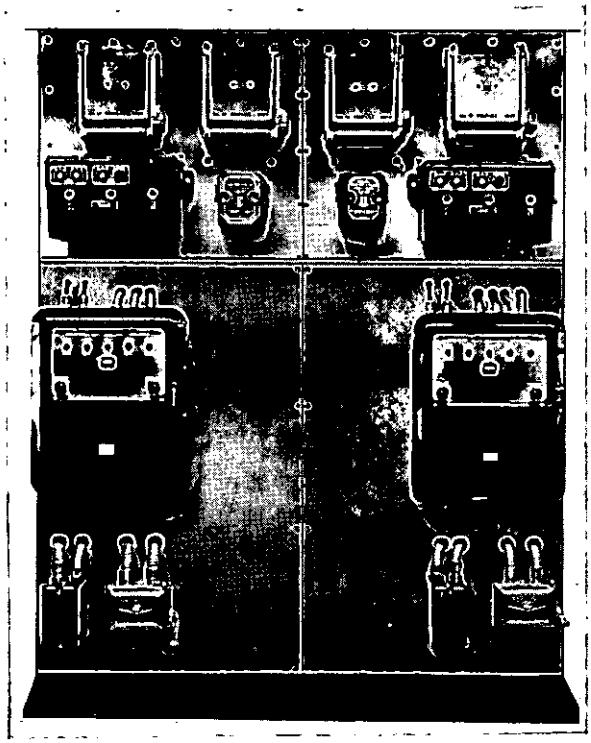


Fig. 3. Master controllers on individual boiler control panels.

Steam is not used directly for space heating, but is supplied to seven strategically sited calorifier stations. Three main hot water systems are fed from these stations, one domestic hot water supply, one forced circulation system employing conventional calorifiers and another medium pressure circulation system in which the pressure can be adjusted as required, up to 60 p.s.i.

Kelvin Hughes instrumentation was installed at the outset and comprised individual panels facing each boiler. Draught gauges, lossmeter, steam flow indicator recorder and integrator instruments were contained in each panel and, in addition, an integrating panel in the Boiler Superintendent's office summated the steam flow and temperatures of the outgoing process and space heating mains. Also contained in the Superintendent's panel were steam pressure recorders, condensate tank temperature recorders and an ambient temperature recorder. Such comprehensive instrumentation facilitated the maintenance of near-test conditions and provided an ideal vehicle for automatic control comparisons.

Automatic control was installed on three boilers in August, 1958, and the three boilers went "fully automatic" on a test basis for the three ensuing winter months from October 1958.

Accurate and detailed reports of loading and fuel consumption had been maintained over a long period, so comparisons between automatic and manual control could be made under all load conditions.

Generally speaking an increase of 5·3% efficiency was achieved over the three month period, the system maintaining an average of 76·9% over the 71·6% obtained by manual firing. A significant factor arising out of a study of the available figures was that, in a comprehensively instrumented and well engineered system, efficiencies bordering on the "automatic" figures can be obtained by manual operation. The main advantage of the automatic

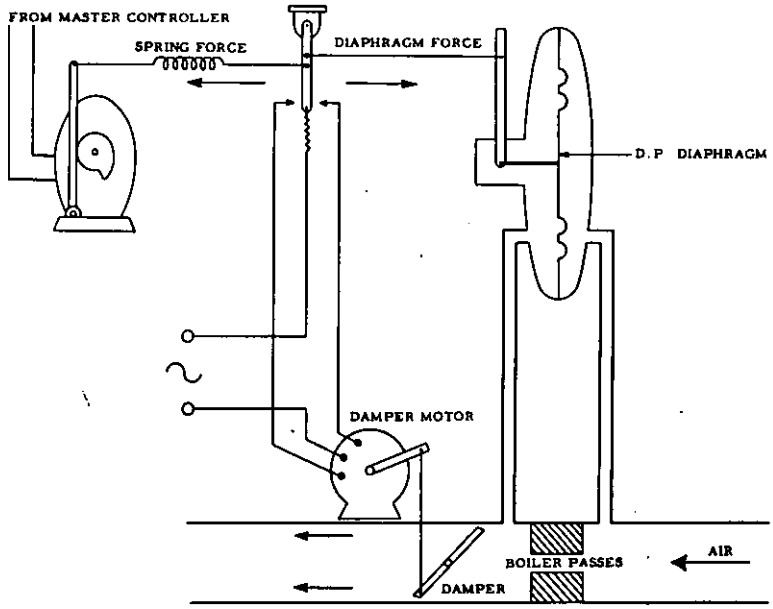


Fig. 4. Schematic airflow control.

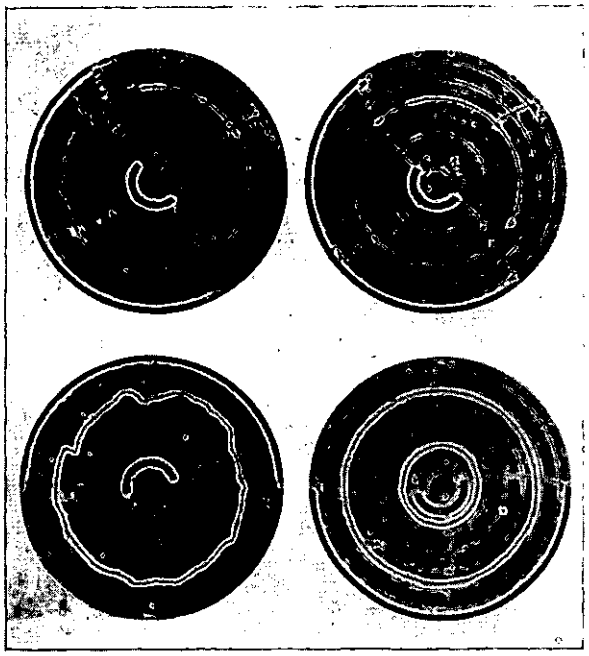


Fig. 5. Comparative Charts for automatic (above) and manual (below) operation of three boilers.

system is the ability to *maintain* the high efficiency working over sustained periods—a practical impossibility by manual means.

Details of Installation

As previously stated, the boilers comprise six Wilson " Super Economic " rated at 15,000 p.p.h. M.C.R. at 150 p.s.i., in two groups of three, with two Weir direct-acting feed pumps sited between the groups.

Coal is delivered through a grid to the boot of a bucket elevator and thence to the chutes of the hoppers (see Fig. 2). Hodgkinson low ram stokers are employed, driven by constant speed A.C. motors. Ash is raked directly on to a submerged conveyor belt which runs below the whole length of the raised firing platform to an external disposal hopper.

A master steam pressure controller situated in the Superintendent's office (Fig. 3) is connected to the main steam header and provides an advance warning of fluctuating loads. Peaked signals, proportional to the fluctuating steam pressures, are relayed by the master controller to the individual combustion controllers regulating the coal feed and airflow to each boiler (Fig. 4).

Coal feed is regulated by the cyclic operation of the constant speed motors driving the mechanical stokers, the running time being proportional to the load as indicated by the master controller. Air flow control is affected by a motorised damper, operated through a push rod and reduction gear, as illustrated in schematic form in Fig. 5.

Pressure differential across the boiler passes is measured and fed to a diaphragm unit. The output of the diaphragm is opposed by a control spring which is tensioned by a square law cam moving in response to the load signals. The resultant force positions a switch which controls the damper motor, thus the air flow is subject to a closed loop control and is independent of the characteristic of the damper motor.

Provision is made on the combustion controllers to enable the fireman to change over to manual control or to adjust the heat regulation at will. The controllers are also balanced to permit load sharing and once set, should require no further adjustment.

Comparisons

Manual Operation

During three winter months the following figures were obtained from three boilers on manual firing.

Average calorific value of fuel = 12,000 B.T.U.s/lb.

Water evaporated = 38,412,460 lb.

Fuel burnt = 4,717,370 lb.

Thus: water evaporated per lb. of fuel $= \frac{38,412,460}{4,717,370} = 8{\cdot}1$ lb.

Average boiler feed water temperature = 162° F.

From Callendars steam tables:—

Total heat in 1 lb. of steam at 150 p.s.i. = 1,194 B.T.U.s

Thus boiler efficiency $= \frac{1,194-(162-32)\times 8{\cdot}1\times 100}{12,000}$

$= 71{\cdot}6\%$

Automatic Control

Over a period of three winter months on automatic operation, the three boilers returned the following figures:—

Average calorific value of fuel = 12,000 B.T.U.s/lb.

Water evaporated = 53,712,700 lb.

Fuel burnt = 6,118,200 lb.

Thus: water evaporated per lb. of fuel $= \frac{53,712,700}{6,118,200} = 8{\cdot}7$ lb.

Average boiler feed water temperature = 162° F.

From Callendars steam tables:—

Total heat in 1 lb. of steam at 150 p.s.i. = 1,194 B.T.U.s

Thus boiler efficiency $= \frac{1,194-(162-32)\times 8{\cdot}7\times 100}{12,000}$

$= 76{\cdot}9\%$

Conclusions

An overall increase in boiler efficiency of 5·3% was achieved for the three months under review.

Fuel savings on automatic control for these three months can be assessed thus:—

Water evaporated for 1 lb. of fuel on manual operation = 8·1 lb.

Water evaporated over three winter months on automatic operation = 53,712,700 lb.

Thus: fuel required on manual operation would have been $= \frac{53,712,700}{8 \cdot 1}$
= 6,621,197 lb.

Fuel used on automatic operation = 6,118,200 lb.

Saving = 512,997 lb.
= 229 tons approx.

Assuming the cost of coal to be £7 per ton, this represents a saving of £1,603 over three winter months, i.e. *more than the cost of the installation.*

Abstract of Reports

GRAYLINGWELL HOSPITAL, CHICHESTER

In their Annual Report of the year ending 31st March, 1959, the Management Committee of Graylingwell Hospital, Chichester, announced that the installation of the Central Boiler House had greatly reduced the cost of heating. "After deducting the income from steam supplied to other authorities, the net cost of fuel, light, and power last year was £19,606 as against £27,567 for the previous year, a reduction of £7,961. An increase in rates, due to an assessment of £2,229 as the rateable value of the new boiler house, and a higher wages cost, makes the net saving to the Committee on the above figures £5,227. Having regard to the fact that the steam supply to this hospital from the Central Boiler House was not connected until mid-June of last year, these results give reason for satisfaction."

This Hospital supplies other local Hospitals with garden produce—the Estate has supplied 35 tons of potatoes, 33 tons of other vegetables and 2 tons of fruit to the Chichester Hospitals.

The output of the printing department has been increased by the purchase of an automatic printing machine. This also is used in aid of other local hospitals. The protective screens and aprons for the Radiological departments of neighbouring hospitals have also been made at Graylingwell.

The work carried out during the year at Havenstoke Park included the following:—

Rubber flooring to Chilgrove, Bramber and Barnet Wards.

Conversion of part of the Insulin Unit for use as a Hospital Library and Physio-therapy Department.

Exterior painting and the redecoration of eleven Wards and Departments.

The Boiler at Summersdale Hospital is to be replaced; it is twenty-five years old and was out of action two weeks last winter owing to one of the sections being severely fractured.

The vacated farm buildings are being made into a patients' social centre. This adaptation is being carried out mainly by groups of men patients, which will include, among other things, a workshop for industrial therapy and a gymnasium with adjoining changing room and sanitary accommodation.

MID-WORCESTER HOSPITAL MANAGEMENT COMMITTEE

The Mid-Worcestershire H.M.C. do not issue an Annual Report. They have, however, produced a booklet covering the work during the first eleven years since the instigation of the National Health Service.

As regards the General Hospitals, the outstanding achievement has been the opening of Bromsgrove General Hospital on 30th August, 1951. This is a modern hospital and provides a full range of specialist services to in-patients and out-patients.

Kidderminster and District General Hospital is being modernised. Part of this programme has been completed, the remainder is under way. This embraces the provision of a new casualty department, a new physiotherapy department and an enlarged X-ray department, a new Pathological Laboratory, a new operating theatre suite and the centralisation of the heating and hot water services in a new boiler house.

At the Smallwood Hospital, Redditch, improvements have also been made. The operating theatres have been modernised and a new boiler house provided, also a new out-patient and new casualty department have been built.

Two new hospitals were opened for the treatment of patients suffering from mental deficiency: Lea Hospital, Bromsgrove, was opened in July 1949, and Lea Castle Hospital, near Kidderminster, in March 1952, which last is to be enlarged. Barnsley Hall Hospital, which is also a mental hospital and is over fifty years old, has had many improvements carried out—such as the modifications to the laundry and boiler house. The hospital has been completely rewired.

A very extensive programme of modernisation has been undertaken at Blakebrook Hospital, which deals with the chronic sick. All the wards on the female side have been up-graded and work has started on the wards accommodating male patients.

Some of the most advanced and modern surgery is carried out at Hill Top Hospital, Bromsgrove. A new operating theatre and X-ray department have been provided.

A model kitchen containing a large number of "gadgets" to enable patients suffering from various forms of rheumatism, to carry on their normal household work, has been installed at Highfield Hospital at Droitwich Spa. The H.M.C. have provided a ground floor ward and modernised the kitchen.

THE ROYAL EARLSWOOD H.M.C.

The year 1959 for the Royal Earlswood H.M.C. had been marked by the announcement by the Ministry of Health of the Hospital Building Programme for 1961-2 which includes the first stage of the long awaited capital development of the Royal Earlswood Hospital. It is proposed that new Villas, a School Unit and a Recreation Hall shall be constructed together with a new Boiler House and plant.

A staff hostel was completed and a second staff hostel is in the process of being built. Two new sanitary annexes have been constructed on the male side of the hospital and sluice rooms have been provided for the sick bay.

At Forest Hospital an engineering duct to serve the new wards has been constructed during the year. The Nurses Home has been completely redecorated internally.

The construction of a new Boiler House, and provision of services completed in October, gave the patients at Farmfield Hospital central heating for the first time. Considerable refurnishings of the houses and improvements in staff quarters have been carried out.

This hospital has for many years had a special function in training patients of a difficult disposition. It is eminently suitable for rehabilitation methods, and these have been applied with great success, even with patients of very low mental capacities. The development of its industrial and training workshops has perhaps been the main feature this year.

The industrial work at the Royal Earlswood and Farmfield Hospitals was first introduced in October 1958, when the Rehabilitation Unit for high grade patients was started at Farmfield Hospital. The scheme involves both finding and teaching the patient to do jobs of an industrial kind and providing him with the necessary information and personal and social skills which he requires, to live independently. Obtaining a supply of suitable work is not a straightforward matter. The jobs must be simple enough to be done without a long period of training.

In October, 1959, two additional rooms were allocated to the Male Occupational Therapy Department at the Royal Earlswood Hospital. At present fifty imbecile patients are engaged on cardboard box assembly in the morning. A month later industrial work was started in the imbecile unit at Farmfield Hospital, consisting of salvaging old and assembling new interlock clips, assembling bobbins for electrical coils, packing rubber bushes, and grading mica.

Altogether, since this work started in 1958, the income from the three workshops in the group has amounted to about £1,500. The issues are quite complex, and the present remarks are intended to bring out some of the problems rather than to suggest that there is one answer which is the correct one.

WOLVERHAMPTON H.M.C.

The eleventh Annual Report covers the period 1st January to 31st December, 1959. There is no real progress to report in plans for the extension of buildings as the approval of the Ministry of Health has not yet been obtained. Nevertheless, there are many general improvements to report in the way of alterations and additions to buildings, redecorations and purchases of new equipment.

It is hoped that it will not be too long before work is begun on the bigger schemes on which planning has already started.

Various of these are as follows:—

The Royal Hospital—four operating theatres.

New Cross Hospital—a new Boiler House.
The provision of a central laundry.

Bridgnorth & South Shropshire Infirmary—
Renewal of gas services.

Women's Hospital—
Theatre improvements and installation of sterilising facilities.

Counties Eye Infirmary—
Replacement of two Boilers.

Women's Hospital—
Installation of Oil Storage Tank.

The Royal Hospital—
Boiler Plant replacement.
Kitchen modernisation.

New Cross Hospital—
Mass Radiography Unit.

Parkfields Hospital—
Central Heating Installation—Ward 3.

The Royal Hospital—
Minor Theatre Unit and Photography/E.C.G. Department.

Broseley Hospital—
Prefabricated building to form Out-patient Department.

At the Royal Hospital a very full programme of work on building and maintenance schemes was carried out. The stonework of the front of the hospital was repaired and renovated.

Owing to a generous gift from an anonymous donor, Deanesly Ward, one of the oldest blocks of the hospital, will be having central heating, new floors and be completely redecorated.

During the year work has started on extensions to the building which will form the Minor Theatre Unit and the Photographic Department. It is hoped that before long work will start on the building of the major operating theatre suite.

The Marson Block at the Women's Hospital has been completely rewired and decorated. The theatre has been fitted with an automatic autoclave.

A new boiler has been installed at Parkfields Hospital and central heating has been provided for Ward 3, which has had a new rubber floor and been entirely redecorated.

During the year many improvements have been carried out at Patshull Rehabilitation Centre: a new floor has been laid in the patients' dining room and new radiators installed. Parts of the building have been rewired.

At Shifnal Cottage Hospital an Orthopædic Clinic was opened at the beginning of October.

A considerable amount of new equipment has been purchased for Wolverhampton and Midland Counties Eye Infirmary. This includes kitchen and ward equipment, furniture, medical and surgical equipment, the most notable being a Light Coagulator from Germany, which now means that the Eye Infirmary is the third hospital in the country to have this instrument. Another purchase from the same firm in Germany is a Zeiss Operating Microscope, which will be particularly beneficial in certain surgical procedures.

There have been several improvements made at Bridgnorth and South Shropshire Infirmary, during the past year, in facilities for patients and staff. Amongst

(Continued on page 230)

Hospital Building

EXPANDING PROGRAMME TO CONTINUE

THERE are now in England and Wales over 180 major hospital building schemes, each costing over a quarter of a million pounds, at various stages of building or planning. This illustration of the increased, and increasing, tempo of hospital building was given by Miss Edith Pitt, Parliamentary Secretary, Ministry of Health, when she visited the new West Cumberland Hospital at Hensingham, near Whitehaven, recently.

She said that the considerably expanded, and still expanding, programme, covering both the construction of new hospitals and the modernisation and extension of existing ones, was now evident to the eye in many parts of the country.

Included in the 180 major schemes chosen by the Minister were 34 new hospitals (including the West Cumberland) of which nine were partially completed, eight had been started, and 17 were at various stages of planning. Two new dental hospitals were also being planned.

The new West Cumberland Hospital, of which the second stage of ward accommodation providing 100 new beds has been in use since last December, will eventually have 416 additional beds. It will provide a comprehensive range of hospital and consultant services for a population of 140,000 in an area which is naturally self contained and geographically at some distance from the nearest alternative hospital centre at Carlisle. Miss Pitt emphasised the responsibility which rested on the community of ensuring that this expansion of hospital facilities was not held up through any lack of skilled staff, including the additional nurses or midwives, needed to staff the new wards and special departments. Miss Pitt also drew attention to the fine new nurses' training school with its first-class residential accommodation which was now being built.

Readers will be interested in the following Boiler House details and the excellent impression created in the illustrations.

The installed boilers are:—

1—10,000 p.p.h. from and at 212°F.

1— 5,000 p.p.h. „ „ „ „

1—Spare for further 10,000 p.p.h.

Manufactured by Joseph Adamson & Co. Ltd., they are of the 3-Pass Economic type, operating at 120 p.s.i. There is an I.D. fan to each boiler with modulating damper. The turbo-jet oil burners are manufactured by Associated British Combustion Co. Ltd., and are burner modulating and fully automatic in operation using oil of 3,500 secs. viscosity.

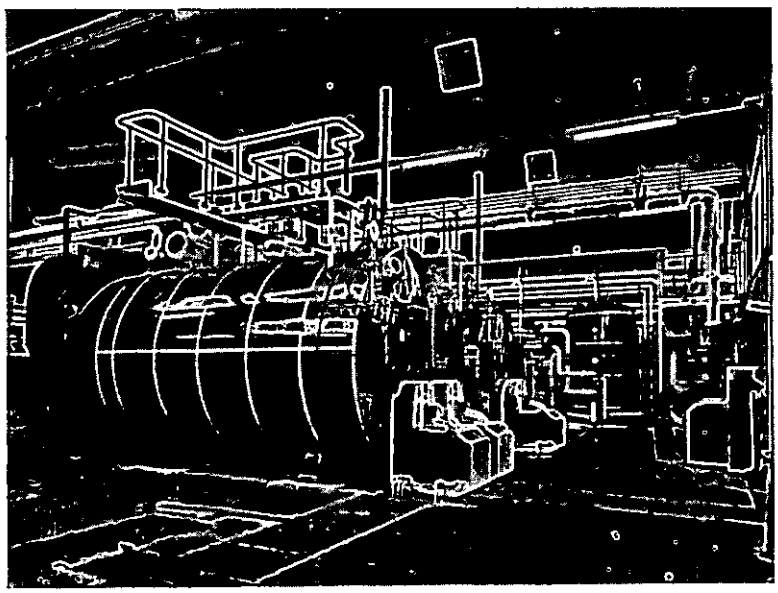
Instrumentation is as follows:—

CO_2—recording and indicating on boiler exit.

Gas Temperature—recording and indicating on boiler exit and combustion chamber.

Draught—indicating on furnaces and boiler exit.

Steam Flow—recording, indicating and integrating on supply to main users.



The Boiler House, West Cumberland Hospital.

The main Control Panel, West Cumberland Hospital Boiler House.

Steam Pressure—recording.

Feed Water—measurement of total water evaporated by rotary meter.

The maximum steam load at the present stage of hospital building is in the order of 4,000 p.p.h. and is carried on the small boiler.

The plant is at present fully manned. However, it is proposed ultimately to operate with a reduced stoking staff and full safety devices have been installed to ensure that the plant will lock-out to the safe position, and an audible alarm will sound in a manned position in the hospital.

Typical performance date is as follows:—

Exit gas CO_2	12·5%
,, ,, temperature	400°F.
Thermal efficiency by difference	81·5%

From records of oil used and steam produced over a period, the equivalent evaporation is 14·4 lbs. of steam from and at 212°F. per lb. of oil which gives a thermal efficiency of 80%.

Smoke free conditions are provided at all times.

Oil storage consists of three vertical cylindrical tanks each holding 7,500 galls. Each tank is fitted with a steam and electric heater, the steam heater being normally used. The oil in the tanks is maintained at a temperature of 120°F. and subsequently raised to 225°F. in a heater situated between the first stage and second stage oil pumps. The fuel oil is delivered to the burners at this temperature and at a pressure of 300 p.s.i.

The feed system is controlled by Thermofeed regulators, the feed pumps being Weir Electrofeeders. There is also a stand-by steam operated Weir pump.

Ancillary equipment includes Ronald Trist "Hilo" low water alarm and Clyde soot blowers.

The chimney is 120 ft. in height and is fitted with a smoke density meter providing audible and visual alarms.

As previously stated, all possible failures are protected. Low water controls, which are duplicated, immediately cause the oil burner to lock-out should the level fall to a danger level, and flame failure is protected by a photo-electric cell. Draught conditions in the furnace required are 0·1–0·2 inches s.w.g. and are obtained by automatic modulation of the induced draught damper. Accidental loss of induced draught is protected by a low draught cut-out switch situated between the induced draught damper and the boiler.

A daily routine is carried out to simulate failure of all automatic controls and ensure their satisfactory performance.

The automatic modulation of the burners ensures the highest combustion efficiency at all rates of firing.

(*Continued from page 228*)

these are the erection of a prefabricated building to provide X-Ray filing and reporting facilities.

At The Lady Forester Hospital, Broseley, work started at the end of 1959 on the foundations for the erection of a new Out-Patient Department. During the year the electrical services throughout the building have been completely rewired.

A new washer was installed in the laundry at The Lady Forester Hospital, Much Wenlock.

B.S.I. News

Abstracts of information supplied by the British Standards Institution

NEW BRITISH STANDARDS

B.S. 3248 : 1960 Sparkguards for solid fuel fires. 3/–

Specifies requirements for the construction and fitting of sparkguards for solid fuel fires. The sparkguard may be a general purpose guard or designed for a specific appliance.

B.S. 3251 : 1960 Hydrant indicator plates. 4/–

Gives details of construction, finish, colour and numeral sizes for fire hydrant indicator plates manufactured from vitreous-enamelled steel, aluminium, cast iron and plastics materials with tests for rigidity and colour weathering.

REVISED BRITISH STANDARDS

B.S. 487 : —— Fusian welded steel air receivers
487 : Part 1 : 1960 For pressures not exceeding 500 lb/sq. in. 8/6

Specifies requirements for Class II and III air receivers for which the design pressure does not exceed 500 lb./sq. in. and the product of the design pressure in lb./sq. in. and internal diameter in inches does not exceed 21,000. It does not apply to compressed gas cylinders. Requirements for materials and formulae for the calculation of shell and end plate thicknesses are included. Types of welded joints are specified with particulars of welding procedure and weld tests. Requirements relating to the dishing and flanging of end plates, inlet and outlet connections, access and compensation for openings are also included and a hydraulic test is stipulated. The standard includes 40 illustrations, most having explanatory notes.

B.S. 1041 : —— Temperature measurement
1041 : Part 3 : 1960 Industrial electrical resistance thermometers. 5/–

Deals with the principles of electrical resistance thermometry and describes the circuits commonly in use for this purpose. Appendices summarise respectively the properties of materials used for electrical resistance elements and the characteristics of thermistors.

B.S. 1099 : 1960 Small fusion-welded steel air receivers. 6/–

Specifies requirements for Class III air receivers for which the design pressure does not exceed 250 lb./sq. in. and the internal diameter does not exceed 12 inches. Requirements for materials and formulae for the calculation of shell and end plate thicknesses are included, together with types of welded joints, welding procedure and requirements relating to the dishing and flanging of end plates and methods of fixing the ends. A hydraulic test is specified. The standard includes 28 illustrations, many with explanatory notes.

AMENDMENT SLIPS

Please order amendment slips by quoting the reference number (PD....) and not the B.S. number.

	Ref. No.
B.S. 1972 : 1953 Low density polythene tube for cold water services. Amendment No. 5	PD 3820
B.S. 2879 : 1957 Draining taps (screw-down pattern). Amendment No. 1	PD 3841
B.S. 3016 : Part 1 : 1958 Low-pressure regulators for use with butane gas. Amendment No. 3	PD 3835

NEW WORK STARTED

Log sheets for steam and hot water boiler plants (revision of B.S. 1374)

The revision is mainly directed to introducing suitably modified log sheets for oil-fired boilers in addition to those for solid fuel appliances.

Electrical cooking and heating appliances. Part 1. General specifications

Part 1 of this new British Standard applies to all cooking and heating appliances for domestic use, and designed for connection to single-phase supplies at voltages not exceeding 250 volts A.C. or D.C. The specification will include requirements and tests to establish a satisfactory standard of safety when the equipment is used under normal conditions.

Memorandum on electrical apparatus having double insulation (revision of B.S. 2754)

The scope of the Memorandum will not be altered, but it is intended to add definitions, more detailed requirements, and tests, for the guidance of Committees drafting specifications for electrical equipment in which double-insulated protection is specified.

Tracking tests for electrical insulating materials

The standard will specify a method of test for indicating the behaviour of solid electrical insulating materials as regards their liability to track at the surface when stressed electrically and when exposed to moisture and atmospheric contamination.

It will not enable materials to be classed rigidly as " non-tracking " or otherwise, but will only indicate their relative behaviour when exposed to moisture while stressed electrically.

DRAFT STANDARDS CIRCULATED FOR COMMENT

A(SAB)9877 Tap washers for B.S. 1010. Taps. [7 pp.]

A(ELE)9888 Enamelled copper conductors (oleo-resinous enamel) Part 1—Round wire (revision of B.S. 156 : Part 1). [23 pp.]

AA(E)110 Direct-reading personal radiation dosemeters. [5 pp.]

AA(TIB)130 British-made blockboard and laminboard. [16 pp.]

AA(SGC)291 Spencer Wells artery forceps (straight and curved) with box joints. [6 pp.]

AA(ELE)372 Capacitors for connection to power-frequency systems (revision of B.S. 1650 : 1955). [27 pp.]

AA(C)414 *p*H scale (revision of B.S. 1647). [10 pp.]

AA(T)824 Ropes made from coir, hemp, manila and sisal (revision of B.S. 2052). [60 pp.]

AA(ELE)1757 Mains operated synchronous clocks (revision of B.S. 472). [9 pp.]

HOSPITAL STERILIZERS

Three new British Standards are made the subject of favourable comment in a recent issue of the *Pharmaceutical Journal*. The standards (B.S. 3219, 3220 and 3213) deal with various types of hospital sterilizers.

The *Pharmaceutical Journal* in a leading article devoted to the proper administration of sterilizing equipment in hospitals comments: " The publication of three new British Standard specifications dealing with sterilizers is no mean achievement. To bring together representatives from so many different organizations and to produce from their comments specifications which are both lucid and informative is most praiseworthy. The specification for dressings sterilizers illustrates particularly the changes in equipment which have gained recognition during the past few years."

HAND-OPERATED CHAIN PULLEY BLOCKS

Users of hand-operated chain pulley blocks—and they are legion, even in this highly mechanised age—will now be able to obtain their equipment " to the requirements of a British Standard."

B.S. 3243 is a 19-page publication specifying requirements for rating, factor of safety, tests, marking—and certain details regarding the construction of the block.

The materials used for the block (steel sections, plates and bars; castings; non-ferrous metals) are required to comply with certain specified British Standards, or alternatively, to have the essential qualities laid down in those specifications.

The manufacturer is required to declare the operating effort and the velocity ratio, although limits to these values are not laid down. Guidance on the appropriate operating effort for various classes of duty is given in an appendix.

A dynamic test with one and a half times the safe working load is required; and there is an optional static test involving the application of twice the safe working load.

Standard Chain

Two types of chain are specified as alternatives: higher tensile steel chain to B.S. 1663; and alloy steel chain to B.S. 3114. There is a recommended standard pitch for the former; the latter is a special load chain for pulley blocks. The pitch, link size, and all relevant dimensions have been so specified as to provide interchangeability.

Appendices

An appendix contains technical advice on the design of connecting links. Other appendices deal with: ratings related to conditions of service; effort related to rating; recommended provisions for inclusion in contracts; and recommendations on the care and safe use of chain pulley blocks.

TWO NEW BUILDING CENTRES

The new Manchester Building Centre was opened to the public last month. There has been very considerable demand from manufacturers for display space within the Centre, and visitors will be able to see a wide range of the latest building products and materials.

Exhibitors are being asked to indicate, where appropriate, that goods conform to British Standards. The Centre is also urging the exhibitors to adopt British Standard sizes in their trade literature.

The opening of the Midland Design and Building Centre has been delayed until the autumn of 1961. A temporary centre is, however, being erected, and was expected to open at the beginning of this month.

THE ROLE OF STANDARDS IN MAINTAINING QUALITY OF COKE

One of the conclusions reached by the Peech Committee on Solid Smokeless Fuels in their report*, published recently, was that the British Standard (B.S. 3412, Part 1) for open fire coke was a great step forward, and that it was important that everything possible should be done to make this coke acceptable to the consumer. The report goes on to say that " we regard it as essential that as soon as practicable all coke used in improved open grates should be made to the specification, that this coke should not be supplied for use on unimproved grates and that consumers should know how to get the best lighting and burning results with it. These three objectives can be achieved, we consider, by a combined operation of producers and distributors."

The committee was set up by the Minister of Power in April 1959 to investigate the requirements for solid smokeless fuel arising from the implementation of the Clean Air Act. It has been assured that the gas industry could make available the additional supply of ¾ million tons a year of British Standard coke to bring the total availability of fuels suitable only for the improved open grate to 4 million tons a year by 1965.

The report says that the committee concludes "after investigating the main criticism made about solid smokeless fuels, particularly coke, and after considering practical, oral and written evidence of their qualities, that the specially reactive manufactured fuels can give satisfactory service on both unimproved and improved open grates and that coke to the British Standard specification and low volatile steam coals, other than dry steam coal, can give satisfactory service on improved open grates."

The committee says that it found the future demand/supply position difficult to assess, particularly in regard to the requirements for the open fire. However, the position for improved open grates is that while the Gas Council estimate that only about one million tons of gas coke has in recent years been used in open fires, 2¾ million tons of coke from gas works which are or will be making coke to the British Standard will be made available to the domestic market during 1960.

**Report of the Committee on Solid Smokeless Fuels.* (Stationery Office. 1s. 3d.)

RUBBER GLOVES FOR ELECTRICAL PURPOSES

This revised publication (B.S. 697 : 1960) specifies requirements for gloves for use at four different voltage potentials: up to 650, 1,100, 3,300, and 4,000 volts.

The gloves may be made by a dipping process or built-up from sheet rubber, or by a moulding process.

A feature of the revision is that each glove is now required to be tested twice by the manufacturer for its voltage withstand. The second test has been introduced to seek out those gloves which have a tendency to pick up excess moisture, which reduces dielectric strength. Research work into this phenomenon has been carried out by the Electrical Research Association, who have taken an active part in the re-drafting of the standard.

An appendix to the standard contains a series of helpful notes relating to the maintenance of the gloves after purchase.

B.S.I.'s Kitemark monogram may be applied to the gloves if the manufacturer is licensed to use it.

Correspondence

22nd September, 1960

The Editor,

DEAR SIR,

The paper presented to the Southern Branch of the Institution of Hospital Engineers entitled, " The Practical Aspects of the High Pressure High Vacuum Sterilizers used in Hospitals," must have been found to be of great value to hospital engineers at this time when so many hospitals are installing such units. The practical comments made can only be endorsed by manufacturers of such equipment, but it might be useful to hear from ancillary equipment manufacturers on any suggestions they have towards the solution of problems associated with the performance of components such as door seatings, vacuum pumps and pressure vacuum gauges in the relevant conditions.

We would agree that the cylindrical sterilizer body is cheaper and simpler to construct than the rectangular. Further, there is slightly less bother involved in the manufacturing of suitable door closing mechanisms. However, the rectangular body

is favoured generally on the grounds that it is considerably easier to pack and make use of all the available space.

The authors ask for lighter section door seatings. These would undoubtedly be beneficial, not only in facilitating fitting, but also in requiring less effort to effect a seal when closing the door. It is to be hoped that these will become available provided that their working life is of satisfactory duration.

It is true that large drain outlet connections do mean larger non-return valves, which increase the trouble involved in attempting to make the check valves work properly under steam vacuum conditions. It has, however, been found possible to design sterilizers which do not rely on check valves.

While it is agreed that dry saturated steam is rarely available, it is absolutely necessary that steam in its driest possible state should be provided for use in sterilizers. This can be dealt with by the sterilizer manufacturers by the provision of a separate steam dryer or by building a steam drying system into the autoclave, but this problem can be far better dealt with by the hospital service engineers.

It is absolutely essential that the design of the chamber should include a means of adequate drainage of moisture from the bottom of the chamber. With a sterilizer provided with a liner, a fall or provision of troughing is essential. It may be argued that condensed steam will be evaporated away as soon as the post-vacuum is initiated. However, this is bad practice, as it merely serves to prolong the time required to pull the necessary post-vacuum. It is far preferable to reduce residual moisture to a minimum by adequate drainage.

It is known that vacuum pump manufacturers are tackling the special problems posed by the sequence of operations required for high speed vacuum sterilization, and a follow-up paper on the practical aspects of the operation and maintenance of these units would be valuable since hospital engineers will be called upon to keep these pumps operating up to specification if the efficiency of sterilization is to be maintained.

Different authorities have different views on the number and size of autoclaves required for a given hospital. The authors are to be applauded for stating their views so clearly and others should be encouraged to do likewise, because all manufacturers will welcome discussion on this important aspect. The authors appear to have had some considerable trouble due to leaky pipe joints. It is not felt that this is a universal problem and it would appear to be taking things to extremes to insist on welded or brazed joints. Satisfactory joints can be made with normal pipework procedure, but the use of P.T.F.E. tape will be found to be an advantage on screwed connections.

There is still not enough known concerning satisfactory filters, perhaps this is one of the fields in which, to use the author's words, " the wishes of the perfectionist have to be modified and subordinated to what is possible and practicable," but it is surely essential that, whatever type of filter is used, this should be itself sterilized between cycles of operation.

There is no doubt that the subject of maintenance should receive more attention than has been the practice in the past, it is obvious from previous papers on sterilizers and sterilization that many sterilizers have become absolutely useless due to lack of maintenance. Now, with the modern High Vacuum Speed Sterilizers, the efficacy of the cycle is dependent on the correct conditions being attained and this, in turn, relies upon the correct working of the various components. Indeed, if an automatic control system is fitted, it is usually arranged that this will not continue the cycle if the correct conditions are not achieved. In other words, maintenance can no longer be regarded as an operation which can be carried out at irregular intervals, if and when it is convenient to do so, but must be regarded as a procedure which needs to be followed regularly and systematically. Maintenance should be treated as a preventative and not a curative action.

When the staff of a hospital are considering the purchase of a high vacuum sterilizer, it is to their advantage to gain some experience of the types available before making their selection. Undoubtedly, a visit to another hospital where one is already in operation is a good method of doing this, and while it is useful to get the opinion of those actually using the equipment, such a visit should be made with a representative of the manufacturing Company, because he will be able to describe any improvements which have since been made and underline any aspect which would be relevant in the prospective customer's site. One such aspect which may need consideration, before the final siting is settled, is that of noise. Where it is planned to have a sterilizing room with open access to the theatre, the mere click of a check valve or the jump of a truck from the floor trolley to the sterilizer rails may be of concern to the Surgeon.

Such a visit to site may also underline the need for the allowance of sufficient room for the installation of the sterilizer. Architects do not always allow sufficient space for correctly spaced equipment, let alone for maintenance. In such circumstances, controls have to be sited close to the sterilizers and sometimes, unfortunately, overhead. Hospital engineers should use every opportunity they have to press for adequate space.

Automatic controls have already been mentioned; where they are fitted they should not only be fully automatic requiring nothing more than the initiation of the correct cycle, but also should be quite incapable of being tampered with while the cycle is in operation. Unless these conditions are fulfilled, the hospital authorities cannot be sure that the correct sterilizing procedure has been followed.

Yours faithfully,

ALLEN & HANBURYS LIMITED
F. J. Conduit,
Director.

Allen & Hanburys Ltd.,
Bethnal Green,
London, E.2.

On the Market

A review of new equipment and materials and their development

A BELLISS & MORCOM ROTARY COMPRESSOR

Known throughout the world for their steam and diesel engines, steam turbines and reciprocating compressors, **Belliss & Morcom Ltd.** of Birmingham, are now making under licence, the French M.P.R. Rotary Compressor. This new development extends their range of compressors into the smaller sizes with what they consider to be the most suitable design for small volume requirements.

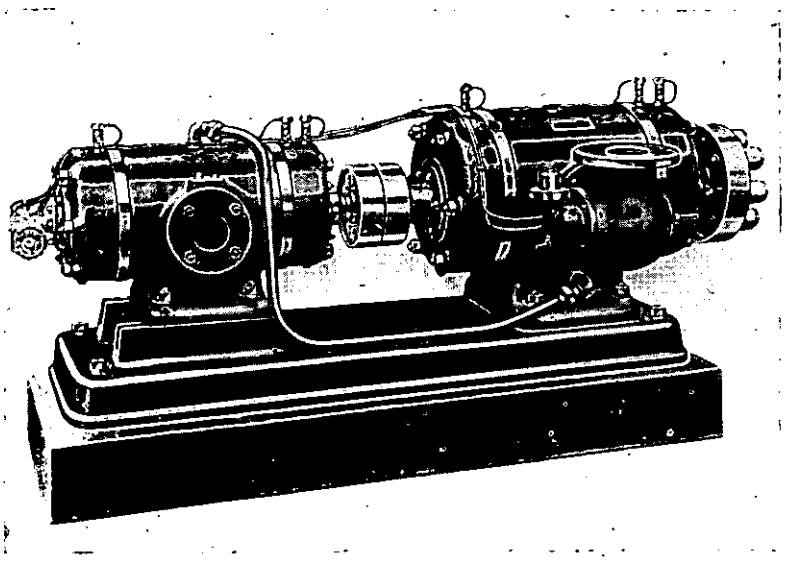
The B. & M. Rotary Compressor is the product of Belliss & Morcom compressor " know-how " built up over 56 years of compressor building, coupled with the experience accumulated by M.P.R. in establishing, during 40 years, an organisation now producing about 1,000 machines a year in France, besides similar numbers under licence in other parts of the world.

The design and construction of the B. & M. Rotary Compressor is inherently simple, yet robust, with the minimum of moving parts. Horizontal, free-sliding blades, machined from a special resin bonded material, are mounted in longitudinal slots in a rotor, and are flung outwards under the influence of centrifugal force, maintaining constant contact with the cylinder walls. The rotor, which is integral with the shaft to avoid shrink fits and unnecessary stresses, is made from high grade solid bar or forgings depending on size, and is eccentric in the cylinder but on the vertical centre-line. This arrangement provides, looking at a cross-section of the cylinder, a free crescent-shaped space divided into compartments by the blades; those on the inlet side gradually increasing in size in the direction of rotation and those on the delivery side gradually decreasing in size.

The cylinder, suitably ported, is cast in one piece with integral water jacket, feet and inlet and outlet branches. The location of these branches on the horizontal plane of opposite sides of the cylinder avoids reversal of the air flow and presents preheating of the incoming cool air. The cylinder head castings which bolt directly on to each end of the cylinder are also water-cooled and carry the main shaft bearings, in addition to forming part of the shaft packing housing.

Heavy duty, high precision roller bearings carry the rotor shaft which is fitted with seals of the plastic axial type, automatically adjusting themselves for wear. Lubrication to the cylinder and bearings is provided by an oil pump with individual adjustment to each point, and a sight flow glass.

Standard units have one or two stages in line but, due to the number of cylinder sizes available, other arrangements of stages and cylinders are easily accommodated to meet most requirements for air compressors, gas compressors, boosters and vacuum pumps. On normal two stage machines, an intercooler of simple design is fitted between stages to reduce the air inlet temperature to the second stage and to remove some of the moisture present in the air.



A typical 2-stage unit showing the shear pin coupling on the extreme right, the flexible coupling between the two cylinders, the inlet control valve on the front side of the right hand cylinder and the oil pump for the cylinders and bearings on the end of the left hand cylinder.

The range of operation of the Rotary Compressors is up to 50 psig for the single stage machines and from 50 to 110 psig for the two stage machines, with outputs from 100 to 600 c.f.m. in the first instance, which will slightly overlap the lower part of the present range of B & M reciprocating compressors.

A direct coupled constant speed AC electric motor is the recommended type of drive because of its simplicity, compactness and reliability, but almost any form of drive is suitable. Where it is desired to use an existing motor in a different speed range a vee belt drive or gears may be incorporated. A shear pin type coupling fitted between the driving motor and the compressor gives a degree of flexibility and acts as a safety device.

As most electric drives are by AC motor running at constant speed, control is usually accomplished by fitting an automatic inlet control valve. This valve shuts off the intake air to the compressor when the selected working pressure has been exceeded by 3 to 5 per cent and reopens when the pressure has dropped to normal. This means that the compressor is either at full load and efficiency or running light. The automatic air discharge release gear opens the delivery branch to atmosphere keeping the light running power to a minimum. A relay mechanism actuated from the discharge side of the delivery non-return valve operates the inlet control valve and is adjustable to vary the pressure at which the control valve operates.

There are many features of this Rotary Compressor which give it advantages over the traditional reciprocating compressors in the smaller sizes: it needs little head room and its smooth, even rotary motion and comparatively light weight virtually dispenses with the need for foundations. Installation is therefore simple and does not involve costly or structural alterations to buildings; in many instances the machine can be delivered, complete with motor, on one combined baseplate which only requires bolting down on to a levelled floor.

NEW CEDAR BUNGALOWS

The above photograph shows a bungalow erected recently at Haslemere and District Hospital, Surrey. It is one of three cedar bungalows purchased by the South West Metropolitan Regional Hospital Board. The other two are at the Royal Earlswood Institution, Redhill, and Warlingham Park Hospital.

All these bungalows are manufactured—the word prefabricated is now rarely used—and are of timber-frame construction, being clad with cedar.

Manufactured bungalows are a great help to hospitals with staff accommodation problems. With them, it means normally that they can be occupied within eight weeks from the time foundations are laid. A high standard of workmanship for the components is ensured, for they are factory-made under close supervision. Cedar bungalows have a high thermal insulation—one-third better than a normal 11 in. cavity brick wall.

Cost of these bungalows is less than traditional buildings of the same size.

The bungalow in the picture is a Southdown Major, a two-bedroom model, and one of the wide range of homes manufactured by **Cedar Homes Ltd.**, of Artington, near Guildford.

A cedar bungalow, one of three supplied to the S.W. Metropolitan R.H.B. and referred to above.

MORE COLOUR IN THE CEILING!

New coloured two-foot and three-foot diffusing panels, for use in Lumenated Module lighting systems, are announced by **Lumenated Ceilings Ltd.,** of Alliance House, Caxton Street, London, S.W.1.

Yellow, green, red and blue translucent plastics diffusing modules are now available, and further colours will be added later according to demand, Apart from their colour, the new modules are identical with the standard white Lumenated Module (type 2SA) and are fitted in the same way. Their light-transmission factors will be slightly lower depending on the particular colour used.

A further innovation announced by the Company is the " Highlight " module, either white or coloured, which carries a recessed spotlight in the centre. They can be fitted with any type of vertical or directional spotlight up to 100 watts to emphasise a special feature.

GENFLEX BELLOWS EXPANSION JOINTS

Vokes Genspring Ltd. have added an entirely new product, the Genflex Bellows Expansion Joint, to their range of pipe suspension equipment.

Unlike the conventional method of absorbing pipe movement by expansion loops which are bulky this new unit is compact, flexible, and is designed to absorb vibration and movement in all planes, simplifying installation and reducing maintenance.

The standard Bellows is produced from 18/8 cold rolled stainless steel sheet, welded into a tube with a longitudinal butt weld. Convolutions are then formed. A most important feature of their construction is that they are produced without any circumferential welds.

Units are available with all patterns of restraint such as hinged, gymbal, tied or articulated and with any type of coupling.

NEW REFRACTORY COATINGS

The swing-over from coal to fuel oil burning in furnaces has resulted in a need for heavy duty refractory coatings to withstand the destructive action of fuel oil on the firebricks, arches, etc.

Corrosion Ltd., of Malvern Road, Southampton, have introduced the Furnascote range of refractories coatings. The range consists of Highglaze, Nonvit and Mortar. These contain high proportions of Zircon compounds to give a heat resistance of up to 3,500° F., and greater resistance to damage of brickwork by free acids or alkalis. Also of interest is that Furnascote is not a refractory "wash," but creates a barrier $\frac{1}{16}$ in. to $\frac{1}{8}$ in. thick of highly refractory compound.

Furnascote is offered at 1s. 9d. per lb., in the form of a dry powder, in 56 lbs. polythene lined drums, to which water can be added by the user.

Trade Notes

IMPORTANT CHANGES AT CHERRY TREE

The Cherry Tree Machine Company has announced changes in the Board and new appointments to the organisation.

Mr. J. MacKrell has long been a Director, and has now assumed responsibilities of Commercial Director. He was for many years on the Council of the Society of Laundry Engineers and Allied Trades Ltd.

Mr. H. J. Carey was appointed to the Board in January, 1960, as Director of Sales. He joined the Company in 1922 as a sales representative, became London Manager in 1932 and Sales Manager in 1948. He is succeeded as Sales Manager by Mr. Bernard Parker, who joined in 1934 and has been assistant Sales Manager for some years.

The newcomers are Mr. John (Ian) McLachlan, who became London Manager from April 4th, 1960, and Mr. William F. Frost who from January 4th has been a sales representative.

" BROWNSON " EXPANSION

As from May 11th, 1960, the company of Messrs. Hodgkison Ltd., 88 Bath Street, E.C.1 will be operating under the direction of A. Browne & Son (Sheet Metal Manufacturers) Ltd., the manufacturers of Brownson catering equipment. Clients of these companies will continue to receive the same good service for which both are renowned, and the ranges of equipment from each will continue as previously. All enquiries for Messrs. Hodkgison Ltd., should, however, be addressed to the Brownson office at 28/30 Hythe Road, Willesden, N.W.10.

HOSPITAL CONTRACT FOR MITCHELLS

The Mitchell Construction Company (Leeds) Limited, a subsidiary of The Mitchell Construction Company Limited of Peterborough and London, have been awarded a £225,000 contract by the Sheffield Regional Hospital Board for the building of a new hospital for the chronic sick at Barnsley, Yorkshire.

The hospital, to be known as the Mount Vernon Hospital, consists of three wards, mortuary and administration blocks, a chapel and nurses home, and will be completed by March next year.

The Architects are Messrs. Hadfield, Cawkwell and Davidson, of Sheffield.

NEW AEI BIRMINGHAM OFFICE

On 8th August the AEI Midland Regional Office in Birmingham moved from its addresses in John Bright Street and Hospital Street to the following single address:

Associated Electrical Industries Ltd.,
Gloucester House,
65 Smallbrook,
Ringway,
Birmingham, 5.

Telephone Nos.: Midland 6335, and Midland 9551.

The Special Sales Offices of AEI-Birlec Ltd., AEI Lamp & Lighting Co. Ltd., AEI Sound Equipment Ltd., the Cable Division, Radio and Electronic Components Division, and Telecommunications Division, as well as Siemens Ediswan Lamps and Lighting, the X-Ray Service Department, and the Construction and Erection Departments remain at their present addresses.

BRAITHWAITE'S LEEDS OFFICE

Isaac Braithwaite & Son Engineers Ltd. report that the expansion which has taken place in the Ibis organisation has made it necessary to seek more suitable premises for their Leeds office, and announce that, as from July 25th, 1960, their address at Leeds is :—

" Cardinal House,"
163, Cardigan Road,
Leeds, 6.

Telephone: Leeds 54152.

Parking facilities are more readily available at the new premises, where they look forward to receiving their friends and catering for their requirements.

NEW BOOKLET DESCRIBES SILICONE LUBRICANTS

When it comes to lubrication of equipment which operates at extremes of heat or cold, silicone fluids and greases perform well for long periods under conditions in which the best organic lubricants would soon fail.

These and other silicone lubricants are described in a booklet which Midland Silicones Ltd. have just published, called " Silicone Lubricating Fluids and Greases." It outlines their properties and suggests applications where they can help to cut maintenance, repair and inspection costs, improve performance and generally achieve greater economy in the operation of many types of equipment. In addition to the remarkably stable viscosity of silicone lubricants over a wide temperature range, the booklet also sets out their other advantages which make them attractive high flash points and low solidification temperatures, resistance to oxidation, to shear breakdown and to many chemicals, low volatility at high temperature and water-repellency.

Copies of this booklet (reference Silicone Notes G14), illustrated with photographs, drawings and tables, are available on request from Midland Silicones Ltd., 68, Knightsbridge, London, S.W.1.

NEW APPOINTMENTS AT BELLISS & MORCOM

Reshaping their sales policy to meet the changing pattern of demand Belliss & Morcom Ltd., of Ledsam Street, Birmingham, have reorganised their sales activities.

This has resulted in two new appointments within the B & M Group; Mr. W. A. Cusins, London Manager, has been appointed Export Sales Manager and will be responsible for all sales in the Commonwealth and Foreign markets.

Mr. B. Noble, Assistant Sales Manager, has been appointed Home Sales Manager and will be responsible for the sales organisation in Great Britain.

BAIRD & TATLOCK APPOINTMENT

Mr. D. F. Haydon has been appointed General Sales Manager of Baird & Tatlock (London) Ltd. Mr. Haydon joined the Company in 1932, and gained experience in the various commercial departments of the organisation before becoming a Technical Sales Representative in the early part of 1939.

Mr. Haydon took up his new appointment on the 1st July.

CODE OF PRACTICE FOR LIGHT-WEIGHT METAL FIXING SYSTEMS

A fifth edition has been published of the Code of Practice and Manual for Light-weight Metal Fixing Systems for Building Linings and Ceilings. This revised Code represents a pooling of information and experience in the application of materials and workmanship developed among members of The Metal Fixing Association for Buildings Insulation since its formation in 1952. The first edition was published in August of that year.

In addition to detailed sections on materials, design, industrial linings, suspended ceilings, work on site and tendering, a Building Research Station note on heat loss through light-sheeted structures is included and there is also a chapter on noise control.

Copies of the Code and lists of members of the Association are obtainable on request from The Secretary, The Metal Fixing Association for Building Insulation, 32 Queen Anne Street, London, W.1 (LANgham 7616).

EVERSHED & VIGNOLES IN BIRMINGHAM

A reorganisation of the Birmingham Area representation of Evershed & Vignoles is announced from the Company's Headquarters office in Chiswick and took effect from July 1st, 1960.

Evershed & Vignoles will now be directly represented by a new Branch Office which has been opened at 58, Oxford Street, Birmingham 5, and covers Derbyshire, Leicestershire, Shropshire, Nottinghamshire, Staffordshire, Warwickshire and Worcestershire. Management of this office is under Mr. E. R. O'Dell.

NEW WALKER, CROSWELLER OFFICES

Walker, Crosweller of Cheltenham—manufacturers of Leonard thermostatic mixing valves, Unatap spray taps, and Arkon instruments—have opened a new office block in the town. This houses their Sales and Service departments, which retain the old telephone number (Cheltenham 56317) and address. Departments at the factory (Accounts, Works Offices, Buying and Publicity) have a new number: Cheltenham 56366.

STANLEY COX TO DISTRIBUTE KELVIN HUGHES LIGHT FITTINGS

Stanley Cox & Co., Ltd., of 93-97 New Cavendish Street, London, have been appointed sole distributors for the range of Kelvin Hughes Operating Theatre Light Fittings. The agreement covers sales in the U.K. and overseas, with the exception of Canada and U.S.A.

Stanley Cox & Co., who are already well established in the electro-medical field, will be able to offer fully comprehensive installation and servicing facilities, augmented by the Kelvin Hughes service to hospitals.

CHERRY TREE APPOINTMENT

Latest newcomer to the expanding Cherry Tree team is Alastair Dempster, who at the age of 31 is already well known in the twin industries.

He has taken over as Cherry Tree Midlands sales representative from A. L. Edwards who, as our readers know, is now acting as an independent consultant.

Notes for Members

News of I.H.E. activities, etc., and items of interest from Branches

PROCEEDINGS OF THE INSTITUTION

The following applications for membership of the Institution have been approved:—

Member

Arnold Frederick Arndt, East Midlands Branch.
Thomas Boag, Midlands Branch.
Bernard Michael Connor, Yorkshire Branch.
Reginald Jack Curry, East Midlands Branch.
Leslie Dennis Etheridge, London Branch.
Vincent George S. Hall, Midlands Branch.
Richard Hamilton, West of England Branch.
Basil Arthur Hermon, East Midlands Branch.
Michael Ian Lees, Midlands Branch.
Joseph Harold Loasby, London Branch.
Ronald Francis Manning, Southern Branch.
Donald Campbell Nicholson, Glasgow Branch.
Gersham Peet, East Midlands Branch.
Ralph Noel Perkins, East Midlands Branch.
James Guyan Taylor, East Midlands Branch.
Robert L. Wake, North-East Branch.

Overseas Member

Victor Philip Cotton, Livingstone, N. Rhodesia.
Geoffrey Busby Taylor, Lagos, Nigeria.

Associate Member

Clifford Ashmore, East Midlands Branch.
Victor Ba Maung, Glasgow Branch.
Allan Rex Bray, West of England Branch.
Albert Dulson, East Midlands Branch.
John Gillan, Glasgow Branch.
Roy Summers Heslam, East Midlands Branch.
John Merlin Joy, London Branch.
Donald Walter Moore, Welsh Branch.
Harry Anderson Nowell, East Midlands Branch.

Student

George Arthur, East Midlands Branch.

Transfer to Full Membership

Richard Geoffrey Freestone, East Midlands Branch.
Samuel Rodney Jacobs, West of England Branch.

WELSH BRANCH—WEEKEND SCHOOL

Osborne Hotel, Langland, September 24th and 25th, 1960

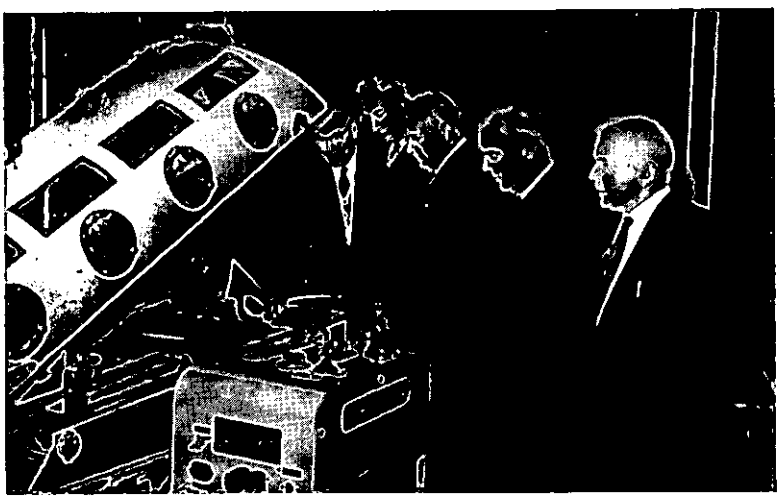
The school was opened by the President of the Institution at 10 a.m. on Saturday, Mr. Sandford saying that he was very pleased to again be present at what is now becoming a regular event.

We were once again blessed with beautiful weather and he was sure that the members present would enjoy not only the lectures and technical discussions, at the school, but also the amenities afforded at Langland, which was the gateway to the Gower Penninsula.

The official luncheon took place following the first lecture and amongst our Guests were the following:—

Ald. Richard Gronow, J.P., Chairman of the Glantawe H.M.C. and Mrs. Gronow.

Councillor Andrew Morgan, Chairman of the Cefn Coed H.M.C. and Mrs. Morgan.



The President and Chairman of the Institution, together with Officers of the Welsh Branch, examining the latest type of Smith-Clarke Respirator, part of a display put on by Capecraft Ltd. for the benefit of Members attending the Weekend School at Langland.

(Photo: South Wales Evening Post)

A happy group of Members and their guests taken on the occasion of the recent Weekend School run so successfully by the Welsh Branch.

(Photo : South Wales Evening Post)

Mr. T. E. Jones, Group Secretary, Glantawe H.M.C. and Mrs. Jones.

Mr. H. Warner, Group Secretary, Cefn Coed H.M.C. and Mrs. Warner.

Mr. T. H. Platt, Chairman of the South Wales Branch, presided.

The toast to the "Queen" was given by the President of the Institution followed by "The Institution of Hospital Engineers" proposed by Richard Gronow, J.P. and responded to by Mr. Sandford. The toast to the "Guests" was proposed by Mr. H. A. Adams, Chairman of the Institution, and responded to by Councillor Andrew Morgan.

The lectures, as listed below, were of great interest and resulted in lively discussions in each instance. It is hoped that they will be submitted for publication in the JOURNAL in due course.

Saturday, September 24th

"Sulphur Problems in Boiler Operation" by H. N. Wigan, M.C., M.INST. PET., Combustion Chemicals Ltd.

"The Development of The Thermal Storage Boiler" by A. Aston, Esq., A.M.INST.FUEL, A.M.I.PLANT.E., Edwin Danks (Oldbury) Ltd.

Sunday, September 25th

"The use of Aluminium Alloys and Glass Fibre in the manufacture of Hospital Equipment, including reference to Special Hospital Equipment" by D. E. R. Fox, Medical Division, Cape Engineering Co. Ltd.

"Corrosion Problems in Boiler Plants" by a member of the Technical Staff of Messrs. Houseman & Thompson Ltd.

Certain items of hospital equipment exhibited by The Cape Engineering Co. Ltd. included one of the latest versions of the Clarke-Smith respirator which excited a great deal of interest not only among the engineers but also on the part of numerous visitors to the hotel.

It was pleasing to welcome several of our ladies who were able to take advantage of grand seaside weather to explore Langland and the nearby bays as well as the new shopping centre now rapidly being built in Swansea.

The school, which terminated at 4 p.m. on Sunday, was a complete success and the Welsh Branch have again decided to repeat the venue next year, the proposed dates being September 23rd and 24th, 1961.

EAST MIDLANDS BRANCH

A meeting of the Branch was held on September 3rd at the Derbyshire Royal Infirmary, Derby.

The discussion of the afternoon was largely a development of matters raised by Mr. Van der Helm in his paper on Sterilisation, at Mansfield on July 16th previously. A number of interesting points were brought up, amongst which were the following:—

Conversions. Automatic operation was favoured generally, but a number of members did not consider a high vacuum essential.

Central Sterilising. No difficulties were apparent if such departments were set up. Suitable packs of pre-determined content could be issued to wards daily.

Syringes. Various methods of sterilising were considered and it was generally agreed that the use of syringes tended to decrease as other medical techniques were finding favour.

Water. Methods of fluid sterilisation were discussed and it was the opinion of members that, where Pyrogen free water was not essential, pre-treatment through a good quality filter press was adequate preparation. Condense was not in favour, especially if certain types of feed water treatment were in operation.

LANCASHIRE BRANCH

The Branch met at Wigan Infirmary on September 3rd.

Arising from the meeting held at Prestwich Hospital on June 24th, there was a discussion regarding the unsatisfactory progress of salary negotiations. It was decided to urge all members who were also members of other organisations to seek as much additional support as possible through those organisations so as to ensure that the maximum pressure was brought to bear in the appropriate quarters.

Several members expressed a desire for more technical subjects at meetings instead of the continual debating of conditions of service.

Mr. Roberts gave a report upon the July Council meeting and said that, in regard to Whitley Council, it had been decided that the Institution would continue to discharge its accepted responsibilities in this respect. An investigation was in hand by a sub-committee of the Staff Side of Committee " D " which it was hoped would result in a stride forward being achieved. Two Regional Engineers had attended the meeting and, in the interests of the Service, had strongly advised Council to take the most urgent view of the present unsatisfactory conditions.

The subject of apprentice engineers as distinct from craft apprentices was also discussed.

At the conclusion of the meeting, Mr. Roberts said that he regretted that he would be unable to continue to represent the Branch on Council for the ensuing year.

YORKSHIRE BRANCH

The Branch held a meeting at the Pontefract General Infirmary on September 10th.

The Chairman, Mr. K. O'Rourke, opened the proceedings by introducing Mr. F. Magnall, Secretary of the Group, who had come along to bid members a welcome on behalf of the H.M.C.

Members then heard a talk upon " Paint and its Application " by representatives of Louis Berger Ltd. and this was supported by a film. Both were very interesting and informative.

After the tea interval, the Chairman presented a membership certificate to Mr. A. Thorpe, Assistant Engineer at Clayton Hospital, Wakefield.

In reply to questions, Mr. J. D. Lewis said that he had no further information as yet concerning the major problems discussed at the July meeting of Council.

It was made known that tickets were now available for the Branch Annual Dinner on December 10th, at 27s. 6d. each, and the Chairman expressed the hope that members would give the event their fullest support.

LONDON BRANCH

The September meeting of the London Branch was held at the Westminster Hospital Medical School on the 20th.

A paper, " Engineering Applications of Electrical Deposition of Metals," was read by Mr. J. W. Oswald, F.R.I.C., A.I.M., Chief Chemist of Fescol Ltd. The speaker began with a short history of the development of electrical deposition, and of the Company's work in reclaiming worn out equipment by coating with thirty different metals. The special applications of these coatings were then described with the support of slides and examples of work done.

A short business session followed, and the vacancy for a Superintendent Engineer to the Worthing Group and the phrasing of correspondence to applicants for membership whose proposal had been rejected were two of the points discussed. In regard to the former it was stated that an appointment was being held in abeyance, while the Chairman agreed to discuss the second point with the Secretary.

Mr. W. M. Woolsey reported on the forthcoming Branch Ladies' Night and said that excellent support was forthcoming.

WHITLEY COUNCIL

A meeting of the full General Council was held on Monday, 25th July, 1960, at 14, Russell Square, W.C.1.

The principal items discussed were:—

Christmas Leave Arrangements, 1960

The Council agreed adjustments to Christmas Leave arrangements consequent on Christmas Day, 1960, falling on a Sunday. A circular notifying the arrangements will be issued in due course.

Meal Allowances

A Management Side offer, based on arrangements operating in the civil service, for payment of a meals allowance, in certain circumstances, for officers required to work late was taken away by the Staff Side for further consideration.

Excess Travelling Expenses

In answer to Staff Side proposals for reimbursement of additional travelling expenses which officers necessarily incurred as a result of compulsory transfer, the Management Side said that in the case of officers compulsorily moved as a temporary arrangement there was already authority in H.M.(48)46 for reimbursement of extra travelling expenses. In regard to compulsory moves of a permanent nature they were not prepared in principle to agree to any payment. Individual cases of hardship could be considered at the Ministry and in their view this adequately covered the position.

Disciplinary Procedure

The Management Side said they had appointed a committee to consider the Staff Side memorandum embodying suggestions for improvements in the code of disciplinary procedure.