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Editorial

THE HEATING AND VENTILATING OF HOSPITAL OPERATING THEATRE SUITES

THE increasing number of post-operative wound infections which are resistant to one or more antibiotics has, during the last few years, focused attention on airborne infections. A reduction in the number of bacteria in the air surrounding a wound gives a proportional decrease in the chance of an infection occurring. The conditions in the theatre are partly suspect particularly when the operation is lengthy, giving prolonged contact between air and wound. Infection also occurs in the wards during subsequent dressing operations. Movement of staff and of contaminated materials (e.g. blankets) release bacteria into the air. Good ventilation with fresh air is needed to avoid a build up to a high level of potential infection.

Reduction in the number of bacteria released into the air is a matter for the Medical Profession. The supply of ventilating air in suitable amounts and adequately dispersed is the concern of the Heating and Ventilating Engineer, but requires full co-operation with medical staff to obtain optimum results.

Background to the present project

An informal discussion on the heating and ventilating of operating theatres was arranged by the Institute of Heating and Ventilating Engineers with the participation of the Medical Research Council. The discussion was reported in the January, 1959, issue of the Institute's Journal.

There was divided opinion on the most appropriate method of introducing air into the theatre. Turbulence with a high air change rate gives a uniform low level of contamination throughout the theatre; under specified conditions, a steady controlled downward movement of air can give an extra lowering of contamination in the region above the wound. Air change rate and temperature level also indicated mixed opinion.

Many were not satisfied with existing plant which did not always retain the facility to ensure design conditions. Improvements of instrumentation, to give early indication of failings, were asked for. Faults could then be corrected before bad conditions in the theatre could build up. Comfortable working conditions must be provided and there is the associated problem of personal preference which introduces control difficulties when a multiple suite is served from one main plant. The overall problem is one of major importance and the reported discussion indicated the need for research.

A literature survey has been carried out by Mrs. S. Dixon of the Heating and Ventilating Research Association and, following this, contact was made with many people who have been responsible for relevant research. Discussions were also arranged with some interested Surgeons, Hospital Administrators and Superintendent Engineers. The various findings have been included in a confidential report which is to be circulated to members of the Association so that, as far as possible, they are up to date with general opinion.

The survey confirmed the need for further research into the heating and ventilating systems to be installed in operating theatre suites and the Association has been fortunate in receiving a substantial Medical Research Council grant to allow some of the work to be carried out. Only a small start has been made on the practical side but negotiations are being made for permission to study plant performance at several hospitals. The practical work will be expanded towards the end of the year when further staff are available.

Future work

Measurement of temperature, humidity and air movement will be made in several modern theatre suites. The control of air movement will be studied on site and by model techniques in the laboratory. This work requires close co-operation with M.R.C. to assess the best air distribution techniques.

Improvements of instrumentation and controls will be sought and a comparison of full and practical air conditioning made. A further aim will be to obtain cooler conditions by reducing heat losses from sterilisers and introducing refrigeration when this appears necessary.

The project, to be successful, requires the fullest support from Hospital Boards and their lay and medical staffs. Of these there is no doubt that the engineering division can make a full and valuable contribution to the research to be carried out by the Association. It can be taken for granted that they will do so wherever and whenever they have an opportunity.

LIQUEFIED PETROLEUM GAS IN I.C. ENGINES

Increasing use is being made of Liquefied Petroleum Gases in many applications of industrial internal combustion engines. The unique advantages offered by this type of fuel were demonstrated at Bingley Hall, Birmingham, earlier this year when Shell-Mex and B.P. Gases Ltd. arranged an exhibition of equipment by six major manufacturers.

The simplicity and speed of adaptation of conventional engines to L.P.G. operation were demonstrated with an actual conversion in the Hall.

It is one of the products of close co-operation between engineers and technical experts of Shell-Mex and B.P. Gases and manufacturers in this field that a range of stackers, dumpers and mechanical sweepers has been developed to use L.P.Gs.

L.P.G. fuelled engines have a lively performance, high efficiency, low running costs, and require very little maintenance. They have a widening range of applications as they can be used anywhere, even in small, enclosed areas, without contamination to goods or distressing effects to personnel. For this reason, equipment with these engines is being used more extensively in food, drink and tobacco production and where characteristics of the exhaust gases of conventional fuels are undesirable.

Entering the carburetter as a dry gas, L.P.Gs mix instantly and completely with air. There is complete combustion resulting in virtually non-toxic exhaust and an absence of odour. With complete combustion there is no wasted fuel to flow down cylinder walls removing and then diluting lubricating oil, and very little carbon deposit in the cylinder and exhaust system. Plugs, oil and filters remain cleaner, resulting in long periods between oil changes.

As L.P.Gs flow to the engine from sealed containers there is no evaporation, spillage or pilfering.

A number of new units designed to operate on L.P.Gs are now being marketed. In addition, conversion kits are obtainable for most i.c. engines. Conversion is a short and simple job and with petrol engines can usually be done by any skilled fitter. Alternatively, the manufacturer of the kits will carry out the work.

Shell-Mex and B.P. Gases distribution service covers the entire United Kingdom and is undertaken from ten main centres. They market two main grades of L.P.Gs—Bottogas (commercial butane) and Propagas (commercial propane)—for use in unlicensed vehicles and small stationary power plants. Bottogas is the fuel for larger engines and is generally supplied in 40 lb. containers which can be fitted to the vehicle. Propagas is supplied in 10 lb. or 24 lb. containers and is the fuel for smaller engines.

The Electronic Control of Hospital Air Conditioning

By R. E. AUSTIN
and D. McG. LAIRD
Honeywell Controls Ltd.

Introduction

IT is now generally realised that the proper control of hospital temperature and humidity is essential to the well-being of patients. In the operating theatre especially, poor space conditions can be harmful to the patient, and uncomfortable for the surgeon, and may also increase the risk of explosion due to the ignition of anaesthetic gases by electrostatic spark discharge. According to the Ministry of Health: " This increased attention to clean air is also influenced by the ever-widening field of modern surgery, and particularly by the increased number of operations which involve the prolonged exposure of large operation wounds."* The surgeon must be able to control heat loss from a patient's body by regulating ambient conditions. And harmful bacteria in the air must be reduced to the minimum as a safeguard against infection. Space conditions in special areas like premature infant nurseries, laboratories, and X-ray departments are also now receiving careful consideration.

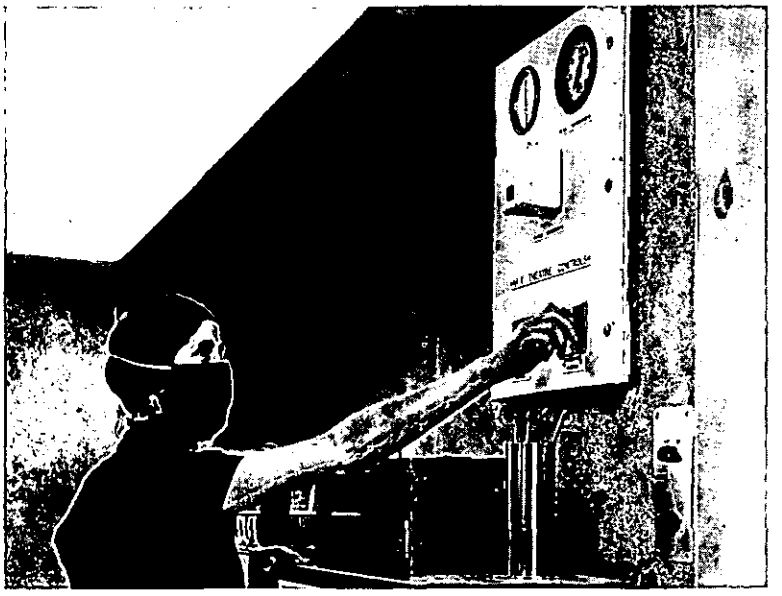
Until comparatively recently hospital managements had to work on very tight budgets which restricted purchase of complete air conditioning plant. Now more money is available and already the demand for new air conditioning plant is growing, and with it the need for suitable automatic control systems. The purpose of this article is to review some general rules and several particular automatic systems which have evolved from experience in this field and which can be used as a basis for planning.

Every hospital has its own particular problems. Sometimes the control systems are installed as part of a modernisation scheme and existing buildings and plant have to be considered when planning the system. On the other hand, installation of controls in new buildings can be planned on the heating engineer's drawing board and combined with ideal plant. This reduces the difficulties, and with them the cost of installation. The basic systems described here can all be altered by the use of additional or alternative components to suit individual problems.

One important feature of the control of hospital space conditions is that the various zones—general ward, maternity, laboratory, etc.—need different

This article is based upon a paper read before the Glasgow Branch.

*Hospital Building Bulletin No. 1. Published for the Ministry of Health by H.M.S.O.



Within easy reach of the theatre . . . temperature and humidity can be regulated during an operation, as soon as the surgeon directs, on this panel situated in the scrub. This is part of a zoned control system installed in the new Jericho theatre suite of St. Thomas's Hospital, Westminster.

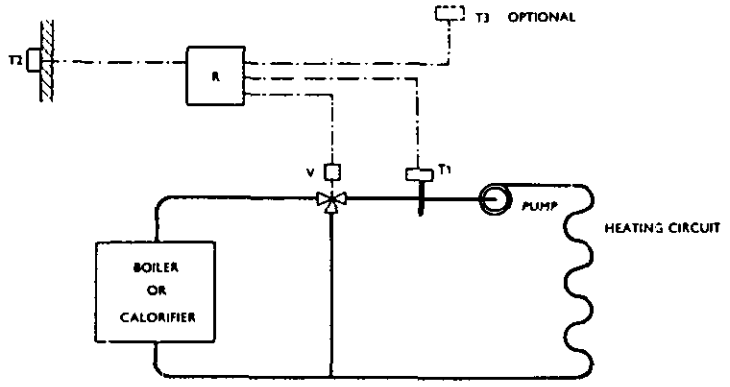


Fig. 1. Aquatrol system. The electronic control panel, R, permits easy, *on-site adjustment of relationship* between flow and outdoor temperature.

conditions; however, ideally, personnel should be able to select the conditions in each zone from a central point. The systems described here are all suitable for use with a central information panel, with remote reset of all control points.

As conditions in the operating theatres are normally controlled to suit the wishes of the surgeon, a suitable indicator and remote set point adjustment for temperature and humidity should be located in an annexe to the theatre.

Components

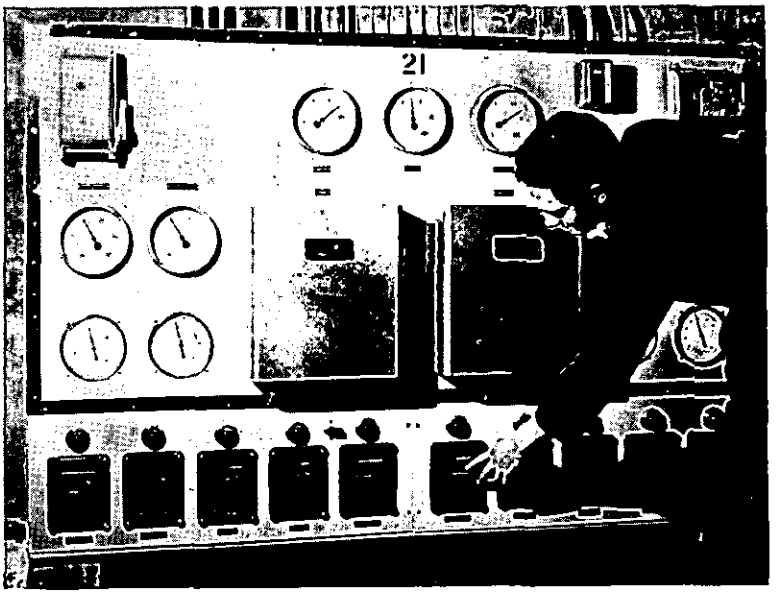
All the systems described here are designed for electronic components. These are more flexible, simpler in construction, safer, more accurate, and operate faster than electric or pneumatic controls.

The versatility of the electronic systems simplifies zone control. In Westminster Hospital as many as five separate zones covering wards, theatres and X-ray units are controlled from one central location.

Electronic thermostats and humidity transducers are simply resistance elements through which the current changes with the space conditions. Having no moving parts, they are both sturdy and safe. Models available qualify for the B.S. 1259 : 1945 intrinsic safety certificate.

Basic Heating and Ventilating Control Systems

In areas where only heating is required, it may be supplied by radiators, embedded panels, or convectors. Fig. 1 illustrates a typical control system for a hot water heating installation of this type, served by a calorifier or a low temperature hot water boiler. With this system, heat is delivered at a rate proportional to heat loss from the zone; so that any desired space temperature is maintained. Signals from an outdoor thermostat T2, and a flow temperature thermostat T1 are co-ordinated by the electronic control panel R. The product of this co-ordination positions the 3-way mixing valve V, thus blending



At the heart of a control system are these electronic control panels which co-ordinate signals from the thermostats and operate motorised valves. The panels shown here were installed in Queen Mary's Hospital, Stratford, as part of a modernisation of existing ventilating plant.

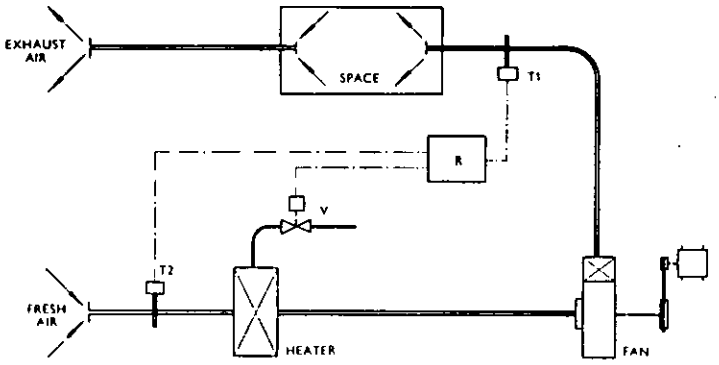


Fig. 2. Air tempering plant. Stable control of discharge air temperature is achieved by co-ordination of signals from T1 and T2 to position the modulating valve, V.

flow and return water to provide a predetermined flow temperature in the heating system. The relationship between outdoor temperature and flow temperature is continuously adjustable within the electronic control panel—to permit tuning on site to suit the particular characteristics of the heating system. If requirements throughout the zone are sufficiently similar, a space thermostat, T3, or averaging space thermostats, may be installed to give primary control from the space. Alternatively, each primary zone, controlled as above, may be divided into sub-zones, each controlled by a space thermostat operating a motorised valve. The result is a greater degree of control—with more comfort and economy—than that already achieved by compensated control of the primary zone.

Air Tempering Plants

When a heated zone is equipped with forced ventilation, the ventilating air must be tempered to near space temperature before delivery. A typical control system for this type of plant is illustrated in Fig. 2. The primary controller, duct thermostat T1, is located in the delivered air duct. It positions, through the electronic relay control panel R, a motorized valve V, on the steam or hot water supply to an air heater battery. If T1 were the only controller, the system would be subject to offset as a result of changes in inlet air temperature; offset is an inherent characteristic of simple proportional control. To anticipate this offset, a duct thermostat T2 is introduced into the fresh air inlet. This thermostat will vary the set point of T1 according to load change.

To prevent the introduction of dust caused by natural convection currents when the tempering plant fan is not running, two-position motorised dampers on the inlet and exhaust ducts can be interlocked with the plant fan; to open when the fan is running and close when it is shut down.

Plenum Heating Systems

During recent years, doctors and bacteriologists have been paying more attention to the cleanliness of air in areas where open wounds are exposed, and patients have low resistance to infection. It has been proved that the presence of harmful bacteria in the atmosphere has a significant effect on health in such areas.

In the early days of surgery it was common practice to use carbolic sprays to kill bacteria in the air. Recent research, carried out in the burns dressing rooms of the Birmingham Accident Hospital, conclusively demonstrated that a 100% fresh air ventilating system is most effective for keeping contamination down to a minimum. Fresh air should be

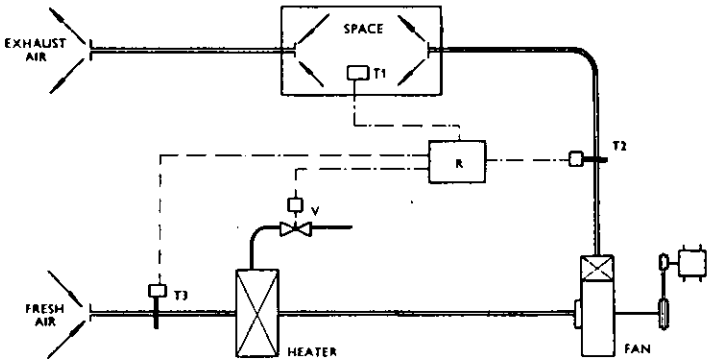


Fig. 3. Plenum heating plant. The three-thermostat team ensures precise and economical control.

taken from as high a position as possible, and a positive air pressure should be maintained in sterile areas to reduce the possibility of contamination by the infiltration of air from non-sterile areas.

A typical control system for a plenum plant is illustrated in Fig. 3. Through electronic control panel R, the space thermostat, T1, positions a motorised valve, V, on the steam or hot water supply to the air heater battery. Duct thermostat T2, located in the supply air duct, stabilises discharge air temperatures. On plants where 100% fresh air is used, a high percentage of load variations is due to variations in incoming air temperature; duct thermostat T3 is incorporated to anticipate the effect of these variations on space temperature. T3 may also raise the space temperature as the outside air temperature falls; this adjustment combats the increasing radiant heat loss from bodies to colder outside walls.

In areas where the total heat supply is provided by a combination of background heating and plenum heating, it is desirable—due to the very different response rates of the two systems—that each be separately controlled. Background heating, which responds comparatively slowly, is best controlled by the compensated system illustrated in Fig. 1. The fast responding plenum heating is controlled by systems similar to that shown in Fig. 3.

Operating Theatre Air Conditioning Systems

The conditions required in the theatre present their own installation problems and the Hospital Building Bulletin, published for the Ministry of Health by Her Majesty's Stationery Office, has put forward several recommendations.

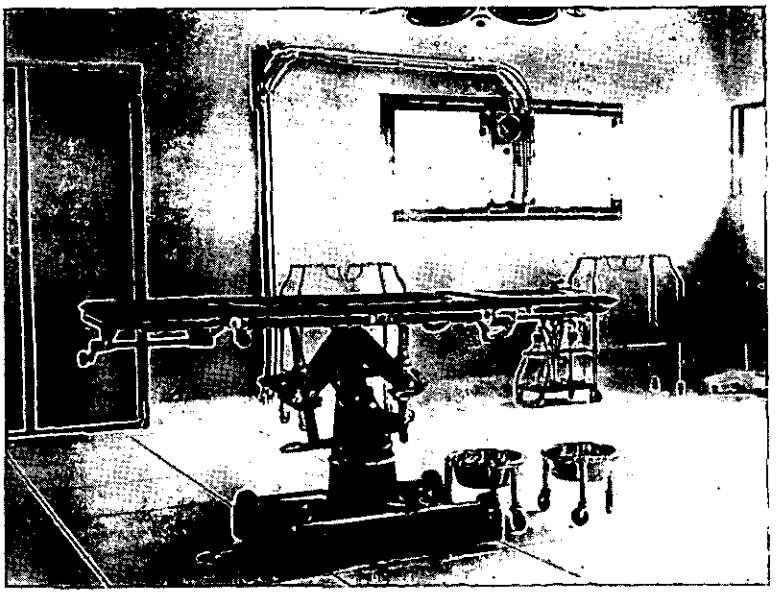
Until recently, comparatively high temperatures, up to 80° F., were thought desirable for the well-being of patients; now temperatures of 70°–75° F. are considered more suitable for general procedure; and they provide better working conditions.

Occasionally however, for special operations, surgeons require temperatures outside this span. The plant must therefore be able to accommodate abnormal as well as normal conditions. The surgeon should be able to call for adjustment of both temperature and humidity and obtain the new conditions in the shortest possible time. For this reason, remote reset controls are normally supplied; they can be situated in an annexe to the theatre or on the theatre sister's desk.

Safety Factors

The level of humidity between 50% and 65% is generally considered to be sufficient to reduce the danger of an electro-static spark discharge which could cause an explosion.

A further complication added by the presence of hazardous atmospheres is that any control equipment used in the danger area must not itself increase the risk of explosion. Models available of both electronic thermostats and humidity transducers qualify for a certificate of intrinsic safety as defined in B.S. 1259 : 1945. When operating theatres are not in use, a comfortable level of temperature may be maintained by background heating; it is not generally considered necessary to run the air handling plant. It should, however, be possible to start the plant from the theatre itself or from an annexe to the theatre; flame-proof switches should be provided for



The safety and efficiency of electronic control systems explains why they were chosen for this modern theatre in St. Thomas's Hospital, Westminster.

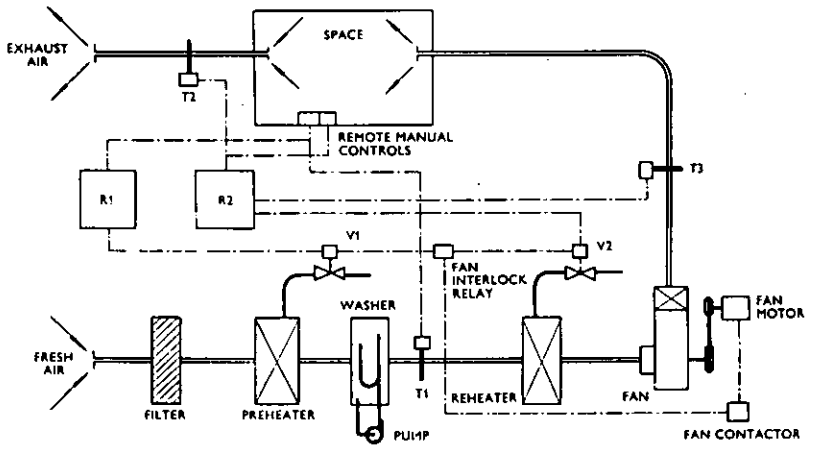


Fig. 4. Partial air conditioning. Remote reset of dry bulb temperature from one or more zones illustrates flexibility of electronic control system.

this purpose, together with signal lamps to indicate that the plant is running.

Partial Air Conditioning

Fig. 4 illustrates a control system for a partial air conditioning plant with provision for control of dry bulb temperature and limited control of moisture level.

An insertion thermostat, T1, is located after the washer eliminator plates. It functions through electronic control panel R1 to maintain a contant dewpoint on the winter cycle, by positioning a modulating valve, V1, on the steam or hot water supply to the pre-heater battery.

Insertion thermostat T2, located in the extract duct from the theatre, acts as the primary controller for the space dry bulb temperature. Another thermostat, T3, is located in the supply air duct—to prevent excessive variation in discharge air temperature, which could be caused by rapid load changes in the space. Thermostats T2 and T3 position, through electronic control panel R2, the motorised valve, V2, on the steam or hot water supply to the reheater battery. A remote manual control, located in an annexe to the theatre, will provide remote reset of the space dry bulb temperature over the required range and will at the same time reset the dewpoint temperature to maintain a constant RH condition. A second manual control may be added to provide variation of humidity by allowing independent reset of dewpoint temperature.

With this system it is common practice to fit a fan interlock relay to run control valves to the closed position when the supply fan is shut down.

Control systems similar to that shown in Fig. 4 are used when twin or triple theatre suites are designed and a separate reheater battery is employed for each theatre. This means that a dry bulb thermostat must be located in the extract from each theatre to control the modulating valve on its own reheater battery. Remote reset of the dry bulb temperature in each

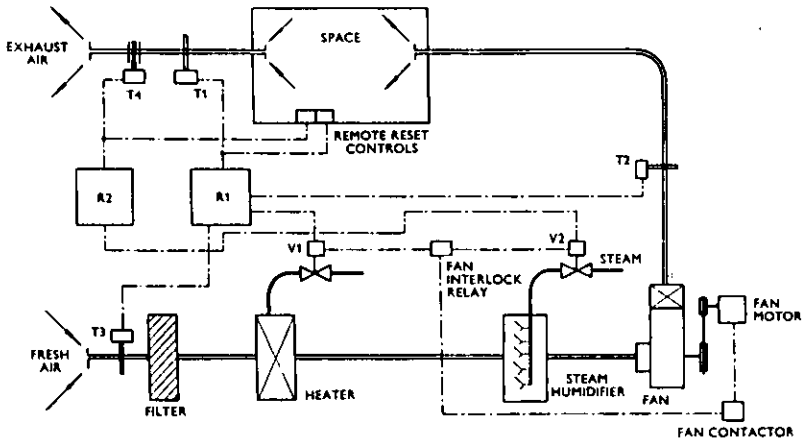


Fig. 5. Steam jet humidification. Versatile electronic controls accommodate selection of any combination of wet and dry bulb temperatures.

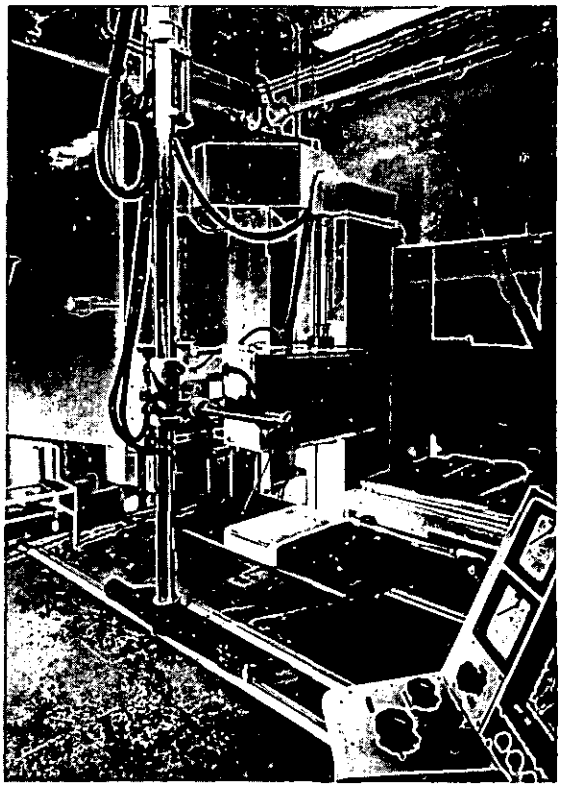
theatre may be obtained by the use of a manual control, but the humidity may be adjusted to suit only one space due to the limitations set by one common washer plant.

Steam Jet Humidification

Where independent control of humidity, in addition to dry bulb temperature control, is required in each theatre the solution may be to incorporate steam humidifiers. A typical control system is shown in Fig. 5. Dry bulb temperature control is achieved as before with an insertion thermostat located in the extract duct, complete with remote reset potentiometer. Modulating control of the steam humidifier is exerted by wet bulb assembly T4, sited adjacent to the dry bulb thermostat in the extract duct. The wet bulb assembly positions the steam valve, V2, through electronic control panel R2. It will be seen that any combination of wet and dry bulb temperatures may be obtained, within the capacity of the plant, to provide the required humidity condition during the winter cycle.

Complete Air Conditioning

Where extremely precise control of humidity and dry bulb temperature is required, for special operations in heart theatres for example, cooling plant may be included as a component of the air conditioning plant to provide complete, year-round, air conditioning. A possible scheme is shown in Fig. 6. Insertion thermostat T1, located after the washer, to which chilled water is available, will control in sequence through electronic control panel R1, a



Control of temperature and humidity is important in the X-ray room of Westminster Hospital. The space thermostat, seen on the far wall, ensures precise control of temperature.

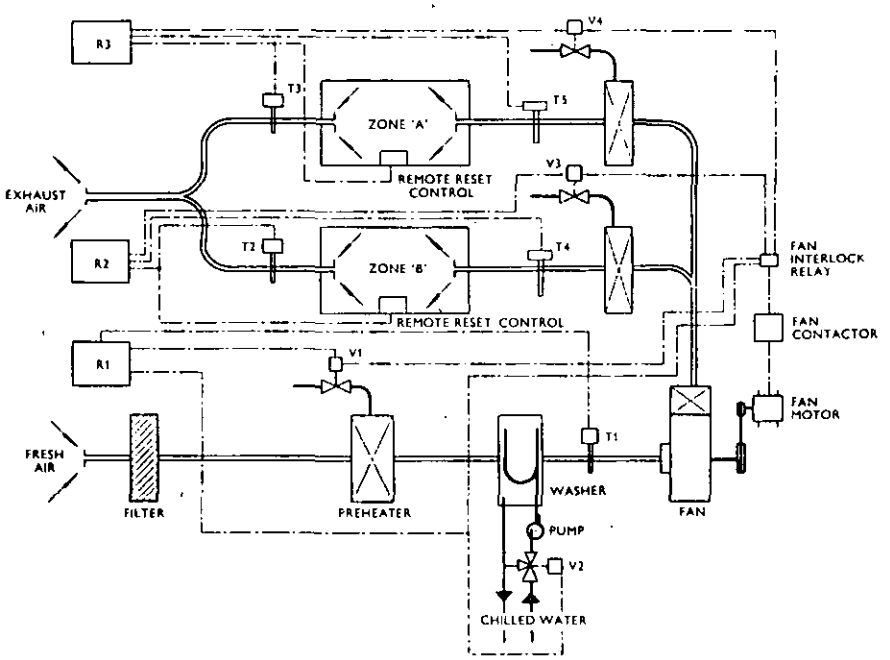
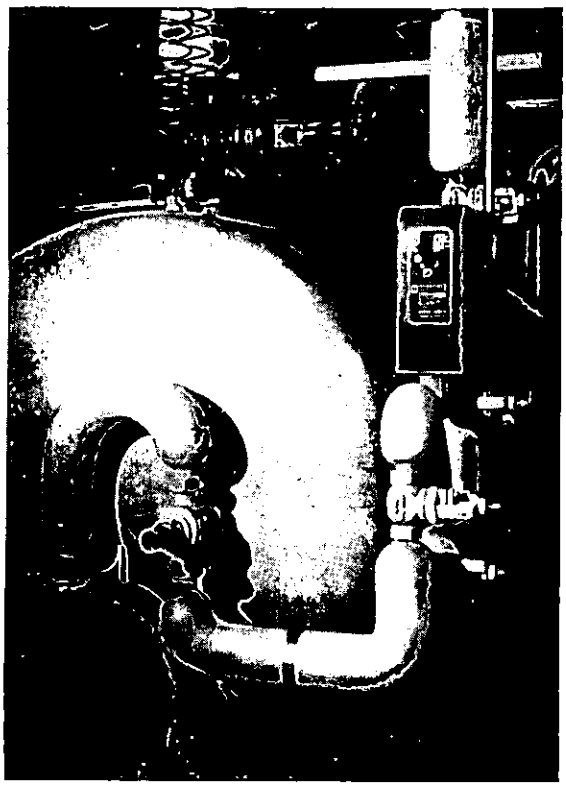


Fig. 6. Complete air conditioning. This electronic control system matches all needs of complete, year-round, air conditioning.

modulating valve, V1, on the steam or hot water supply to the pre-heater battery and a 3-way mixing valve, V2, on the chilled water supply to the washer. In this version a constant dewpoint temperature can be maintained. Reset of this dewpoint temperature by remote manual controls in the annexe to the theatres may be incorporated to vary the relative humidity conditions. As before, dry bulb thermostats located in the extract from each theatre will control, through a suitable electronic control panel, a motorised valve on the steam or hot water supply to its respective reheater battery. Remote reset of dry bulb temperatures may be achieved as previously described.

Zone Control

The tendency in hospital building today is to design theatres as suites of two or three—as illustrated in Fig. 6—with shared amenities for sterilising, scrub up, anaesthetic, stores and recovery rooms. In these cases plants designed for zone control are required, so that space conditions in each theatre can be adjusted separately to meet the individual surgeon's needs. Zoned systems have been successfully installed in several hospitals during the last few years.



The link between control and heating systems—a motorised valve controls a steam supply in the comprehensive five-zone air conditioning system at Westminster Hospital.

St. Thomas's Hospital, Westminster, Queen Mary's Stratford, and Harold Wood Hospital are all notable examples of modernisation projects which adopted a zoned system. New hospitals at Swindon and Londonderry also incorporated twin theatre suites with zone-controlled air conditioning. In Londonderry a particularly wide variation in temperature and humidity was catered for.

In the systems shown, the dry bulb temperature can be adjusted separately for each zone. The dewpoint level may be reset from either theatre, but this will affect both.

Application Notes

The selection of the controlling thermostat for an operating theatre, which is sometimes difficult, should be determined after consideration of the number of air changes per hour provided by the plant. If below six, control from a space thermostat is recommended. If the number of changes is in excess of six per hour it is generally satisfactory to use a duct thermostat as previously described. If the theatre extract is effected via other areas, such as sterilising and wash-up, a thermostat located in this extract would be unlikely to give a true measure of theatre temperature. Therefore, regardless of the plant rate of air change, a space thermostat should be used; unless special measures, such as a special sampling extract from the theatre itself, are included in the design.

When wet bulb controllers are used, as in the system illustrated in Fig. 5, a minimum velocity of 900 feet per minute at the thermostat is necessary; below this figure an accurate measurement of wet bulb temperature will not be obtained. In some cases a humidity controller may be substituted for the wet bulb assembly, but the control point of these instruments is difficult to reset remotely and care must be taken to avoid the open contact type of unit.

The requirements of hospital heating and air conditioning systems are many and varied and each should be given individual consideration. It is hoped, however, that the control schemes discussed above may form a useful basis for planning. They are based on experience of installations in many hospitals, including: Queen Charlotte's Hospital, W.6.; Westminster Hospital; Guy's Hospital; St. Bartholomew's Hospital; Royal Masonic Hospital; Great Ormond Street Hospital; St. Thomas's Hospital, Westminster; Derbyshire Royal Infirmary; Queen Mary's Hospital, Stratford; Royal Marsden Hospital; Exeter City Hospital; Southampton General Hospital; Hammersmith Hospital; Harold Wood Hospital; Knowle Hospital; King Edward VII Hospital; St. Paul's Hospital; Queen Victoria Hospital, East Grinstead; St. Bernard's Hospital, Southall; Queen Mary's (Roehampton) Hospital; St. David's Hospital, Carmarthen; Victoria Hospital, Deal; Freedom Fields Hospital; Whipps Cross Hospital.

Use of Thermal Storage Boilers in Hospital Steam Plants*

By BRUCE JOHNSON,
M.I.H.V.E., A.M.Inst.F.

THE reason that prompted the investigation and subsequent acceptance of the thermal storage type of steam boiler plant in the new hospital at Welwyn Garden City was, frankly, fear that the conventional plant would be liable to smutting under low steam load conditions.

This is a completely new hospital and one, we hope, we can be proud of. Mr. J. Galloway, M.I.Mech.E., M.I.E.E., M.I.H.V.E., Regional Engineer, North West Metropolitan Regional Hospital Board, left no avenue unexplored in investigating closely each and every proposition put forward. The computed steam load variation in the new hospital varied from 30,000 lbs. per hour on a cold Winter's morning to some 1,000 lbs. per hour on a hot Summer's evening (there being adequate domestic hot water storage available). With such wide load variations, it can be readily appreciated that with a multi-boiler oil-fired installation when working on a minimum load, discharging into a common brick flue, thereon to the brick stack, the risk of excessive smutting was very real.

The proposal to build the boiler house with a separate stack to each boiler, apart from making the boiler house look like an antiquated battleship, was not looked upon by the Regional Architect with much enthusiasm.

To ensure that the plant would operate efficiently with the minimum of smoke and smut emission, the following conclusions were arrived at:

1. The modulation of the oil-firing equipment and the consequential variation in volume, velocity and temperature of the flue gases must be kept to a minimum.
2. Long periods of low flame running which are so conducive to bad combustion and inherent faults must be eliminated.

We will now compare the conventional type of tank boiler with the new Thermal Storage Boiler. The conventional boiler has, among other things, a water inlet, a steam outlet, a water gauge and a variable fire, and it is the aim of the operator to co-ordinate either automatically or manually the heat and water put into the boiler with the steam taken out.

The latest development in the thermal storage field is the Thermal Storage Boiler, manufactured by Edwin Danks & Co. (Oldbury) Limited. This is based upon patents held by Dr. E. G. Ritchie, D.Sc., A.M.Inst.C.E., M.I.Mech.E., F.Inst.F., F.I.Plant.E., who was chief engineer and technical director of Ruths Steam Storage Limited over a period of fifteen years, terminating in 1942. In this capacity he had a wide experience of the application of thermal storage installations in industry and power generating stations, arising out of which was developed the Thermal Storage Boiler. This avoids the necessity for installing costly thermal storage vessels of large capacity, with their accompanying high radiation loss.

The Thermal Storage Boiler combines in one shell the functions of a steam generator, a feed water accumulator, and a steam accumulator. In this type of boiler the heating surface, firing equipment, fans, ducting, chimney, etc., are all designed to meet the average steam demand, the shell being enlarged in diameter as compared with an ordinary boiler, to provide for a substantial rise and fall of water level. The rate of feed to the boiler is controlled by a regulator, pressure impulsed from the steam main; so that, with the oncoming of a peak, and with the consequent drop in steam pressure, the regulator closes, and the water level in the boiler drops. With the occurrence of a valley in the steam demand the steam pressure tends to rise. This opens the regulator, and the water level in the boiler is regained. In short, during peak periods steam is raised from water at saturation temperature, and during off-peak periods steam is raised from water at hotwell temperature. The difference in the total heat of steam in the two instances, along with the flywheel effect of the enlarged water volume, enables the boiler to be fired at a constant rate over long periods, meeting a widely varying steam demand without variation in pressure, conditions ideal to the attainment of maximum thermal efficiency.

Fig. 1 shows the Thermal Storage Boiler in diagrammatic detail. In such boilers the shell is usually increased in diameter by 18 inches to 2 feet as compared with the design of a normal boiler, thus permitting of a rise and fall of water level of about 2 ft. 6 in. The feed water regulator, pressure impulsed from the steam main, is fitted with high and low water level over-controls, to prevent the water rising above a pre-determined level or dropping below a pre-determined level. The over-controls operate independently of the pressure in the steam space of the boiler. The usual audible and visual signals are

*Paper presented on May 26th, 1960, to the Association of Hospital Superintendent Engineers.

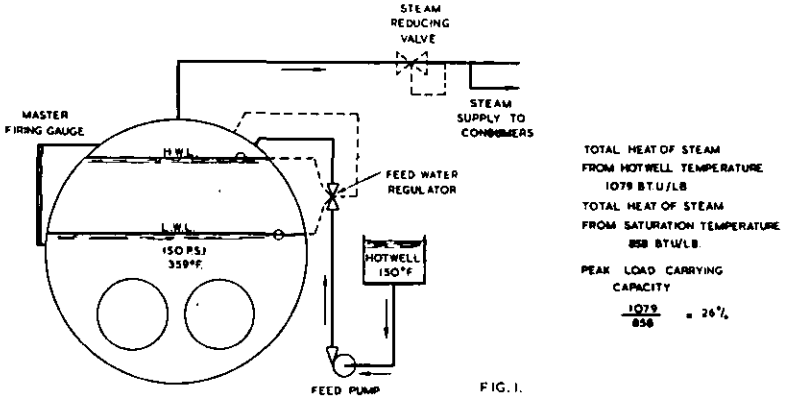


Fig. 1. The Thermal Storage Boiler in diagrammatic detail.

provided, to give the fireman additional warning of high and low water level conditions.

In the design of the thermal storage boiler it ought to be pointed out that the free disengaging surface at high water level is no less than the free disengaging surface in a normal boiler. At any other level it is greater, due to the increase in shell diameter.

A very important feature of the thermal storage boiler is the master firing gauge, which is, in fact, a modified form of water level gauge. This is so graduated and marked as to give the fireman due warning of any change in the rate of firing made necessary by change in the average steam demand. Such change can be brought about slowly, without panic, and without sacrifice of combustion efficiency. The point here is that the slow moving water column takes the place of the fast moving pressure gauge in a normal boiler so far as this concerns guidance to the fireman.

Fig. 1 incorporates a steam reducing valve. The purpose of this is, in relation to the installation of a thermal storage boiler, to operate in conjunction with existing boilers. Under such conditions the thermal storage boiler is usually designed for a higher working pressure than the existing boilers, the function of the reducing valve being to maintain a constant pressure on the existing boilers, all peak loads and valleys being passed on to the thermal storage boiler. In this manner the firing rate of existing boilers is stabilised as well as that of the thermal storage boiler, with a double gain in operating efficiency.

Fig. 2 illustrates the application of the thermal storage boiler to a typical steam chart. In this the

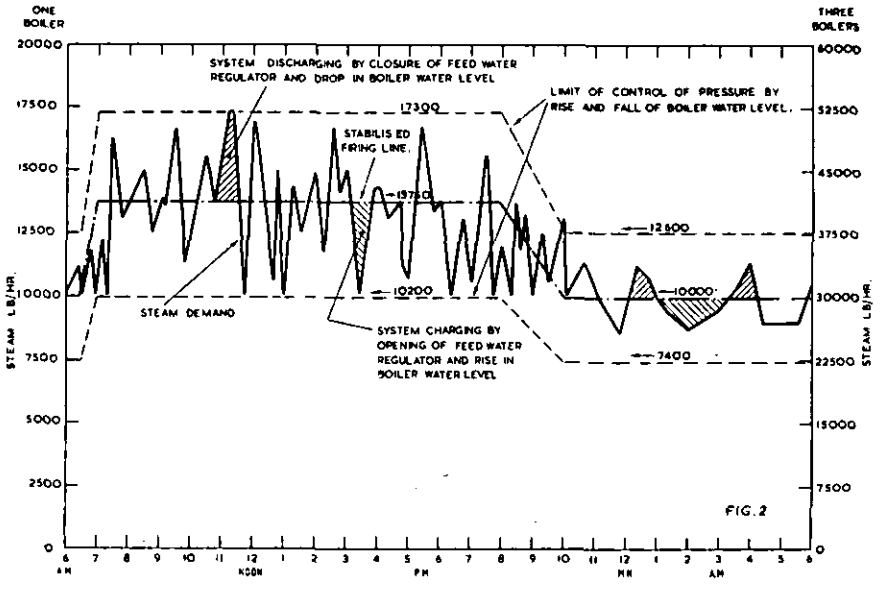


Fig. 2. The application of the Thermal Storage Boiler to a typical steam chart.

present steam demand averages 13,750 lb./hr. during the day and 10,000 lb./hr. during the night, but a considerable increase in steam demand is anticipated. The present steam demand would be met by one boiler and ultimately three boilers would be installed. Both conditions are illustrated in this diagram.

During the day the existing load, which varies between 10,000 and 17,500 lb./hr., would be met with a constant firing rate of 13,750 lb./hr. from 7 a.m. to 8 p.m., breaking down to the night load level of 10,000 lb./hr. at about 10 p.m. until 6.30 a.m. the following morning, peaks and valleys being covered by automatic rise and fall of water level, as shown by the respective cross hatched areas. During the whole of the 24 hours the firing rate would be stabilised, as shown, and the boiler pressure would remain constant.

With a three-fold increase in steam demand, as shown by the right-hand scale, variations from 30,000 to 52,000 lb./hr. would be taken care of by automatic rise and fall of water level without change in firing rate and without change in boiler pressure.

The thermal storage boiler, with its large water volume, can, in addition to its other functions, act under pressure drop as a steam accumulator, with the burners closed down, to meet low steam demands during the night. This feature of the system is likely to prove extremely useful in hospitals, as reducing the amount of boilerhouse labour required at certain seasons of the year.

The thermal storage boiler can be fired with coal or oil; it can be manually operated or fired automatically.

In conclusion, it would appear that the thermal storage boiler offers considerable advantage in connection with hospital heating installations as a means of stabilising the firing rate under the widely varying loads that have to be met from hour to hour, from day to day, and from season to season. This enables a high combustion efficiency to be maintained, in addition to which the steam pressure remains constant, so that heat consuming units maintain the efficiency and performance for which they were designed.

I would like to acknowledge the help received from Dr. Ritchie in the preparation of this Paper and to congratulate him on the success of this very interesting development.

I would also like to express my appreciation for the help given to me by the staff of Messrs. Edwin Danks & Co. (Oldbury) Ltd.

Drayton Regulator visit

ON 8th July thirty-two members from the Midlands branch of the Institution of Hospital Engineers visited the works of the Drayton Regulator Co., Ltd., at West Drayton, Middlesex. The party arrived by coach and went straight to the company's new sports pavilion for lunch and a short introductory talk by the Drayton Sales Manager, Mr. G. J. Belt.

Mr. Belt explained that the Drayton Regulator Co. embraced several subsidiary companies. These included Drayton Johnson Ltd., who specialise in steam engineering for the paper, plastics and textile trades, etc.; Drayton Southern Ltd., specialists in the manufacture of Data Processing and other electronic apparatus; and Drayton Controls (Heating) Ltd., for heating and ventilating controls. A new company was also mentioned and this will specialise in the complete engineering for Central Sterile Supply Organisations and operating theatre equipment.

After lunch the party was split into four separate groups to attend a complete tour of the works and two demonstrations. The works tour started with a visit to the research and development workshops.

Considerable interest was shown in the quantity and variety of equipment available in this department. Here, new projects first see the light and are prepared for manufacture on a production basis. The bellows manufacturing department was visited next and the members saw metal bellows being manufactured by a unique hydraulic method. This method is to place a seamless drawn tube into a collapsible die which is fully extended. Water at a pressure of up to 600 lbs. per sq. in. is fed into the tube. At the same time a pressure in excess of this figure collapses the die with the tube in it. The collapsed die is opened and the bellows extracted.

The machine shop was visited next.

In the bellows soldering shop were seen the thermostatic systems for the Drayton controllers and regulators and also some of the 600,000 thermostatic systems that are supplied to other customers for use in their equipment each year. The electrical shop was the next stop and the party saw small electric motors of the capacitor start and the shaded pole type being manufactured. These motors have a very extensive use and a variety of speeds from 2,700 r.p.m. to 28 m.p.r. are available. Drayton controls and regulators were seen in the course of manufacture in the instrument shop.

The hospital equipment department gave a demonstration of the latest type high speed high vacuum autoclave control and pumping unit. These controls were on a routine test prior to being despatched to a customer and the visitors had an opportunity to see them operating on an autoclave. These controls incorporate the Drayton barometrically compensated vacuum switch and, of course, the Drayton time/temperature integrator. A

(Continued on page 159)

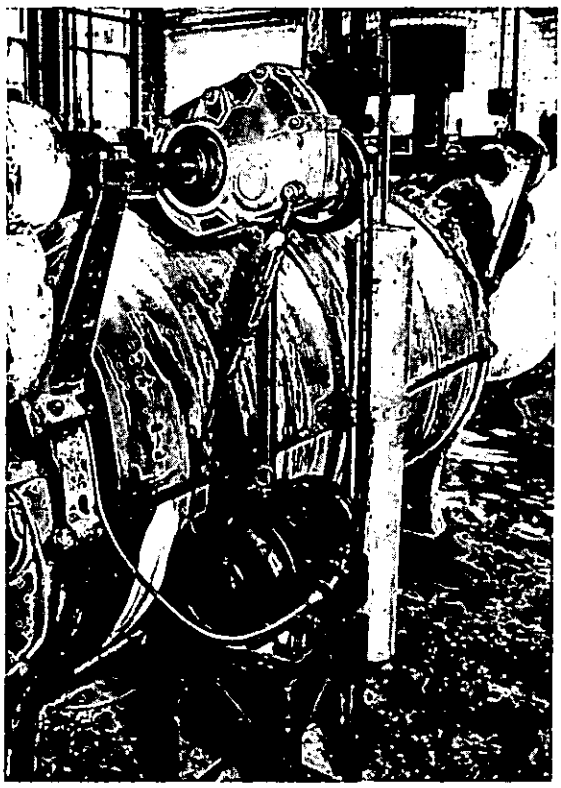
Motorisation Aids in a Group Laundry Service

BY A CONTRIBUTOR

JOYCE GREEN Hospital, Dartford, stands behind a modern housing estate in a stretch of former marshland which runs east from London along the northern edge of Kent. The low-lying ground is slowly being built upon and pylons and chimneys provide every year a denser skyline where, not long ago, only marsh-grass and gulls were to be seen.

The hospital, a number of detached buildings set in wide grounds, shows its face to the Thames, which here is strictly a river of utility. The visitor by road now enters the hospital by what was originally its rear.

The reason for this throws a certain light upon the progress of medical services during the last 80 years. For Joyce Green is the successor to a flotilla of three " smallpox hulks " which, until 1903, were moored in Long Reach.



A close-up of a Lister washing machine, fitted with a 5 h.p. Crompton drip-proof motor and Fenner Torque Arm speed reducer driven through two Fenner B93 Vee-belts. The existing countershaft and gearing of the washing machine are adapted to individual electric drive. The guard has been removed from the Vee-belt drive for the sake of clarity.

The hulks are said to have been 50-gun frigates converted to hospital ships and were, no doubt, as unprepossessing as their function.

They lay in the Thames from 1884 until, in December, 1903, Joyce Green Isolation Hospital was opened. Nucleus of the hospital was a farmhouse.

The link with the river, however, was not lost. Behind the hospital at that time lay a region of undeveloped land with few roads, and patients were brought to Joyce Green by boat and carried up from the muddy foreshore in a kind of glass-sided tram. All supplies were brought to the hospital in the same way, and there are still old people living in the district who remember seeing the " pox wagon " creaking its way through the marsh to the hospital.

If Joyce Green has a past, however, it also has a future. Under the National Health Service it is a large up-to-date establishment, serving a wide field. Among its modern departments is its laundry, which, by terms of a centralisation scheme being put into effect by the Dartford Hospital Committee, serves five other local hospitals. This involves a weekly throughput of some 58,500 pieces, ranging from nurses' clothing to bed sheets.

The laundry has, today, 12 horizontal washers, of various sizes arranged in four rows of three, plus a vertical automatic machine with self-contained drive used for " hand " washing. The horizontal washers, with a number of hydros, were formerly driven by a 30 h.p. electric motor through overhead shafting, with mechanical provision for change of rotation. This machinery had been in use since the nineteen-twenties. It was, of course, necessary to run the motor no matter how many washers were not in use.

It became evident to the Dartford Hospital Authorities that the laundry could become generally more efficient, and the cost per article be reduced, if the machines were separately motorised. A survey of the machine room was carried out. This showed that each washer could be motorised, using the existing countershafts, with provision for electrical reversing, and a contract was awarded to Crompton Parkinson Ltd.

The twelve washers consist of 6 Lister, 2 Tullis, 2 Cherry Tree, 1 Bradford and 1 London machines. Crompton electric motors of from 2 h.p. to 5 h.p. were specified, according to the sizes of the washers, the largest of which are four Listers and the Bradford. This made a total of 41 h.p., but with the advantage that only those motors actually in use need be run.

General view of two centre rows of washing machines after individual motorisation.

All the motors are of 4-pole speed and in order to obtain the speed reduction necessary to match the machines, Fenner Torque Arm Speed Reducers and Vee-belts were incorporated. The motors, of drip-proof squirrel cage type, were mounted on fabricated steel stools beside the machines and fitted with driving pulleys for double Vee-belts, of suitable size for the speed reduction necessary in each case. The Fenner speed reducers were mounted on the original machine countershafts and carry the driven pulleys, also suitably proportioned. The output side of the speed reducer feeds by a short hollow shaft into the original gearing of the machine. The speed reducer is steadied by an adjustable strut attached to the casing of the machine.

Under the new arrangement the cumbersome mechanical reversing gear is replaced by electrical reversing. This is carried out, on a 12 to 15-second cycle, by individual timers for each machine in a multi-motor contactor board designed and manufactured by M.T.E. Control Gear Ltd. Each motor is controlled by an automatic reversing starter, and the timing mechanisms are adjustable. Overload relays and H.R.C. fuses are fitted to each panel and all the

The motor control board, designed and made by M.T.E. Control Gear Ltd., which incorporates an automatic reversing starter for each motor, with individual adjustable timing mechanism, relays and fuses.

control gear is neatly housed at one end of the machine room, connections to the motors being taken overhead through copper conduit screwed into the motor connecting boxes. Each washer can be started or stopped by the operator, by means of push buttons mounted conveniently on the machine.

All the actual installation work was carried out by the Hospital Engineering staff without any serious disruption of production. The method adopted was to immobilise one machine at a time and all the machines were dealt with in this way in a little over three months. This period included the time occupied by the substitution of the least serviceable machines by some in better condition made redundant when the laundry of the Southern hospital was closed down under the centralisation scheme.

The capital cost of individual motorisation of a hospital laundry, such as that carried out at Joyce Green, will not, of course, be incurred by a management committee without a clear indication of the savings to be expected. So far as this hospital is concerned, at this stage it is possible only to point generally to what they are. Electric power consumption, although roughly one-third more horsepower has been installed, is said to be approximately at the same level as formerly, despite the fact that new air-conditioning plant and a drier have also been installed. Individual motor drives are therefore cheaper to run than the old single drive.

The actual increase in useful energy per kilowatt is probably very much greater than these facts suggest. Line shafting, with long and complicated belt drives, is intrinsically wasteful of power—each bearing and belt is a source of power loss which must increase as the system ages. Moreover, line shafting installations are now almost invariably past their mechanical prime—the one at Joyce Green Hospital was almost 30 years old—and their performance probably bears little relation to their theoretical rating.

Since individual motorisation was adopted in this laundry it has been possible to divert the work of ten operators from the washers. On the maintenance side, the amount of work called for has naturally fallen heavily and it is reasonable to expect this condition to continue even when the equipment installed is no longer new. Moreover, the possibility of a breakdown in the machine drive—which under the old system would throw all the machines out of use—is no longer a source of apprehension.

There are several less tangible advantages. The removal of line shafting, with its flying belts, produces a much less obstructed work-space. Alterations to lay-out of machines can be made easily and the rational planning of trolley routes into, within and out of the washroom is facilitated. Too often the way in which such matters are dealt with is dictated by the actually irrelevant factor of line-shafting location.

The total of 58,500 articles per 44-hour week which Joyce Green hospital laundry deals with at present is likely soon to be increased by 8,000 to 10,000 articles, when another hospital enters the group scheme and when it is brought to its ultimate conclusion.

(Continued from page 156)

rapid instrument steriliser for ward use was on show and caused considerable interest. Also demonstrated was a sterile water apparatus for producing sterile water from boiler steam at less cost than with a conventional still.

Drayton Controls (Heating) Ltd., demonstrated two pneumatic control systems, the first, on a high velocity dual duct air conditioning scheme where the operation of both main plant and mixing box controls was clearly shown. The second was a conventional air conditioning system comprising fresh air inlet, spill and recirculation dampers, pre-heaters, sprays, reheater and a booster heater/cooler battery. The automatic changeover of dampers and heater/cooler valves for Summer/Winter conditions was demonstrated.

A new Indoor/Outdoor controller, the Teletronic Variostat, was also on view and has impressive versatility. It has been designed to follow the theoretical curves produced by the I.H.V.E. in conjunction with H.M. Office of Works. The nominal slope of the flow temperature/outdoor curve can be varied continuously over the range 1 : 1 to 6 : 1. Up to six motors can be operated either simultaneously or sequentially from one control unit, and remote manual operation may be carried out by the use of switches incorporated in the place of the control unit.

The unit itself has an optional door with lock, and control knobs are situated behind a removable perspex cover. Morning boost and Night depression features may be switched either manually or by time switch.

Mr. Ashton, Chairman of the Midlands Branch, proposed a vote of thanks to the management and staff of the Drayton Companies.

CAPE ASBESTOS RESULTS

The Cape Asbestos Group's net profit for 1959 was a record at £944,068 compared with £754,266 in 1958. Sales of Rocksil, Rockwall Asbestolux Asbestos Insulation Board had never been exceeded. Demand for Rocksil had been so great that another furnace was being built. Sales of subsidiary companies' products had, in nearly all cases, registered a marked increase, and a pleasing feature of the results was the success which had attended the Group's policy of diversification.

SMITHS INDUSTRIAL DIVISION

The Board of S. Smith & Sons (England) Ltd. announce that a new division has been formed to integrate the business in industrial products which have hitherto been made or marketed by Smiths Industrial Instruments Ltd., Kelvin & Hughes Industrial Ltd. and David Harcourt Ltd. The assets and undertakings of these three companies will be transferred to S. Smith & Sons (England) Ltd. with effect from midnight July 31st, and will henceforth adopt the training style Smiths Industrial Division.

Abstract of Reports

HACKNEY GROUP No. 6 H.M.C.

During the year ending 31st March, 1960, few major capital works were completed, though many plans and schemes for extension and modernising work were prepared, including plans for re-organisation of the main kitchen at German Hospital, the provision of a new Pathological Laboratory at Hackney and a new Block to provide a Dispensary, Out-patients Department and Pathological Laboratory at Mothers' Hospital.

No provision was made by the Regional Board for the allocation of any sum during 1959/60 for the execution of minor capital works, as it was felt that the sums allotted during previous years should be sufficient for most of the really urgent small schemes required.

Some important work was completed during this year in the field of maintenance and plant replacement.

The X-ray Department of this group has extended during the year, and improved and additional equipment has been provided.

Many works of improvement were carried out during the year at Hackney Hospital, including new lighting provided in the front area of the hospital, the installation of new high-speed vacuum sterilisers in the hospital's administrative building, a modernised and improved functional layout of the Casualty Department and a new operating lamp in the operating theatre.

At the Eastern Hospital, the rewiring of the Nurses' Home with the installation of A.C. electrical supply was virtually completed.

The extension and modernisation of the Casualty Department and the completion of the redecoration and rewiring of Ward 5 were among the number of developments, improvements and maintenance works carried out at German Hospital.

The Entrance Hall of The Mothers' Hospital (Salvation Army) has been enlarged and remodelled, and Block 7 of this hospital is now rewired electrically. The Regional Hospital Board is considering extensive schemes for the hospital comprising modernisation of Labour Ward suites and reorganisation of all the toilet facilities.

HERTFORD GROUP No. 1 H.M.C.

In their twelfth Annual Report for the year ending 31st March, 1960, particular stress is laid by this Group upon the serious thought and planning needed to provide adequate and available facilities for the future development of the hospital service in the Group. Despite many recent improvements, lack of finance has tended to limit their aims and much remains to be done. With this in view, a development plan, embodying many major capital projects, is in the final stages of being evolved. The implementation of the plan will take a few years to complete, but an envisaged " master " plan will commence in the very near future, and each year should see progress towards bringing the hospitals in the Group on a par with the new hospitals now being built.

During the past year detailed attention has been given to the control of infection in hospitals and provision has been made in capital expenditure to meet the introduction of new and improved techniques.

The new Boiler House in the Hertford County Hospital is functioning and in full operation, and the Casualty Department has also been finished, and has considerably improved the Department and the service afforded to patients. During the current year it is envisaged that steam supplies will be made available to provide heating in the Nurses' Home and to the Operating Theatre main autoclaves and other ancillary units, and it is intended to improve overbed lights in the wards.

Improvements to the Occupational Therapy Department at the Ware Park Hospital are in hand, and considerable minor works have been carried out during the year, which have provided improvements to the services of the hospital. The major work carried out at the Bishop's Stortford & District Hospital has been the installation of a new X-ray unit at a cost of some £7,500. The efforts of the Management Committee of the Herts & Essex General Hospital are primarily directed to the upgrading of the hospital, and with this aim in view many schemes are at present before the Committee, including one for a new Boiler House and calorifiers, improvements to Maternity Department, installation of electrical power points in Wards and Theatre, and a scheme to provide steam supplies for a separate source of heating to the Operating Theatre, domestic hot water service and radiators. A number of very major improvements have been referred to the Regional Board and are in various stages of planning. These include a new Operating Theatre Unit, an Ophthalmic Unit, a small Psychiatric Unit and a new X-ray Department. Various improvements, notably the introduction of certain labour-saving devices, have been installed or effected during the past year.

HENDON GROUP H.M.C.

Edgware General Hospital report that in February 1958, Ward C6 was incorporated in the Eye Department. Work had been commenced in December of the previous year to enlarge the existing Eye Theatre in C7 Ward. The hoped for extension of the Out-patient Department and provisions of new pathology laboratories, allowing subsequent extension of the X-ray Department, had again been postponed. The date for the planned commencement at the time of the report was 1961, and completion would probably not be achieved before 1964.

The Consultant Staff of Hendon District Hospital have benefited from a much needed Surgeons' Changing Room adjacent to the Theatre, and the Hospital is looking forward to the promised new equipment for the X-ray Department.

The new Centre for Poliomyelitis Research of the Hendon Isolation Hospital was officially opened on the 25th June, 1958, by the Rt. Hon. The Earl of Limerick, G.B.E., K.C.B., D.S.O. The Centre, in addition to offices and stores, houses a workshop, two laboratories and a physiotherapy room with a hydrotherapy room adjoining.

The Management Committee has undertaken modification of the ward buildings in order to provide a Theatre, together with a sterilising and equipment room, for emergency tracheotomy operations. A considerable amount

of special ward equipment has also been provided. Recently, an emergency electricity generator has been installed, so that the various mechanical breathing aids with which the ward is equipped can be kept in action in the event of a power supply failure.

The new Theatre at the Colindale Hospital was started after some delays, in the autumn of 1958 and good progress was made.

ARCHWAY GROUP H.M.C.

In their tenth Annual Report for the year ending 31st March, 1959, the Archway Group state that work commenced on November 24th, 1958 on the upgrading of the Maternity Department, St. Mary's Wing, Whittington Hospital, which it is estimated will take one year to complete. This is part of a programme for general upgrading and redecoration for the year, of which very few items were completed because of various emergencies which took priority over all other requirements. One of these emergencies was at St. Mary's Wing, where the heating and hot water calorifier had to be retubed in order to avoid a breakdown of services.

One of the larger programmed items of work undertaken at St. Mary's Wing was the external repair and redecoration of " F " Block.

The Regional Board laid new steam mains to " D " and " E " Blocks and undertook the conversion of the electricity supply at St. Mary's Wing to the L.E.B. standard voltage. At Hornsey Central Hospital the existing coal fired heating and hot water boilers were replaced by an oil burning installation by the Regional Hospital Board.

The extent of Minor Capital Works carried out during the year was greater than in previous years due to a further allocation by the Regional Board. This enabled several valuable works of adaptation to be carried out, including the installation of power points at Highgate Wing and the conversion of the side ward of Ward H11 to form an office for E.N.T. Surgeons. In addition, steam operated bowl and instrument sterilisers were purchased and installed in various wards at St. Mary's Wing and Ward MD4 was converted into two wards for male and female neurosurgical cases.

The improvements to the main kitchen and servery at St. Mary's Wing of Whittington Hospital referred to in the previous report, have been completed, and a similar large scheme of improvements was commenced in March 1959 to the main kitchen and dining rooms at New End Hospital, as the result of a further grant from the King Edward's Hospital Fund for London.

Among Whittington Hospital's most pressing needs remain a new centralised Out-patient Department, adequate arrangements for ward sterilisation of instruments, bowls and bedpans, and additional operating theatres.

The Clinical Work of Hornsey Central Hospital was greatly assisted during 1958 by the opening of the new Out-patients Department and modernised X-ray Services. Another project commenced at the hospital during that year was the Surgeons' Changing Room. The installation of oil-fired boilers, a major capital work item costing some £12,000, was also completed by the Regional Board.

B.S.I. News

Abstracts from information supplied by the British Standards Institution

B.S.I. PUBLICATIONS—SPECIAL ISSUE

Addendum packet No. 9 to B.S. Handbook No. 3: Building. 10/-

This packet comprises eight summaries of standards not previously included, also addendum sheets to cover revisions or amendments issued for 20 standards since the publication of the eighth addendum packet. The information includes a revised contents list and is correct to 1st March, 1960. On and after 1st May the additions and revisions in this and the previous addendum packets will be incorporated in all copies of Handbook No. 3 sold (price £4). Holders of Handbook No. 3 who have registered with B.S.I. have been notified of the availability of the new addendum packet.

NEW BRITISH STANDARDS

B.S. 3242 : 1960 Aluminium alloy conductors for overhead power transmission. 4/6

Specifies requirements and dimensions for overhead line conductors made of heat-treated aluminium-magnesium-silicon alloy. Standard values for the physical properties of the alloy wires are given and standard sizes of wires and stranded conductors are tabulated. The maximum resistivity of the material and the minimum breaking load of each standard wire are specified. Tests for breaking load, elongation and resistivity are included. Appendices deal with strength of stranded conductors and modulus of elasticity and give code names for use when ordering standard conductors.

B.S. 3244 : 1960 Domestic pressure cookers with embedded electric elements (safety requirements). 4/6

Specifies the minimum safety requirements for domestic pressure cookers up to 5 gallons capacity which have embedded heating elements.
Clauses cover materials manufacture, proof testing of cooker and electrical components, pressure relief devices, bursting strength and a works production test to which each cooker must be subjected.

B.S. 3300: 1960 Kerosine (paraffin) unflued space heaters, cooking and boiling appliances for domestic use. 10/-

Specifies general constructional, guarding and safety requirements of these appliances, and detailed performance tests. Typical burners and appliances are illustrated.

NEW CODE OF PRACTICE

CP 143 : —— Sheet roof coverings

CP 143 : Part 3 : 1960 Lead roof coverings. 7/6

This Code gives comprehensive guidance on the use of lead sheet used as a covering for roofs. Recommendations are made regarding the types of substructures, design methods for both the wood-roll and hollow-roll systems and details of the laying techniques involved. The Code carries 17 illustrations and in appendices gives a table of weights and equivalent thicknesses and details of the physical properties of lead sheet.

REVISED BRITISH STANDARDS

B.S. 896 : —— Stretchers and stretcher carriers

896 : Part 1 : 1960 Dimensions. 3/-

Specifies the essential dimensions for stretchers and stretcher carriers in ambulances and aircraft, to ensure interchangeability.

B.S. 1780 : 1960 Bourdon tube pressure and vacuum gauges. 15/-

Applies to indicating pressure gauges, vacuum gauges and combined pressure and vacuum gauges of the bourdon tube type from 2 in. to 12 in. nominal size, with maximum scale readings up to 16,000 lb./sq. in. or up to 6 ton/sq. in. It covers test gauges with concentric scales and industrial gauges with concentric and eccentric scales, and gives a range of sizes for direct mounting and surface mounting gauges, and a series of standard pressure ranges and scale graduations. Materials and construction, dimensions, accuracy and methods of test are specified, and recommendations for installation and use, together with notes on testing apparatus and methods, are given.

REVISED CODE OF PRACTICE

CP 143 : —— Sheet roof coverings

CP 143 : Part 4 : 1960 Copper roof coverings. 7/6

This Code deals with copper sheet and strip used as a covering for roofs. Recommendations are made regarding the types of substructure, use of underlays, design methods of both the standing seam and common roll systems and details of the laying techniques involved.

The Code recommendations are illustrated with a series of 20 drawings. Tables of gauges, thicknesses, weights of copper sheets; dimensional details of copper gutters, and information on the properties of copper are given in appendices.

BRITISH STANDARDS REVIEWED AND CONFIRMED

The following British Standards have been reviewed in accordance with B.S.I. procedure and have been confirmed as satisfying present requirements:

B.S. 537 : 1951 Lancashire and Cornish boilers of riveted construction (with published amendment)

B.S. 609 : 1951 Horizontal multitubular boilers of riveted construction (with published amendment)

B.S. 665 : 1951 Vertical cross tube boilers of riveted construction (with published amendment)

B.S. 761 : 1951 Vertical multitubular boilers of riveted construction (with published amendment)

AMENDMENT SLIPS

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

	Ref. No.
B.S. 328 Part 1 : 1959 Twist drills. Amendment No. 1	PD 3706
B.S. 1113 : 1958 Water tube boilers and their integral superheaters. Amendment No. 2	PD 3715
B.S. 1704 : 1951 General purpose thermometers. Amendment No. 2	PD 3717
B.S. 1900 : 1952 Secondary reference thermometers. Amendment No. 4	PD 3719
B.S. 2790 : 1956 Cylindrical land steam boilers of welded construction (other than water-tube boilers). Amendment No. 1	PD 3694

PUBLICATIONS WITHDRAWN

B.S. 2049 Part 1 : 1953 Kerosine (paraffin) appliances for domestic use. Part 1. Burners, portable space heaters, cooking and boiling appliances (replaced by B.S. 3300 : 1960, see page 23)

CP 143.104 : 1951 Copper coverings for roofs (replaced by CP 143 Part 4 : 1960)

NEW WORK STARTED

Steel plate, sheet and strip (revision of B.S. 1449)

The revision, intended to meet the demand for an extended range of products, will be divided into 4 parts as follows:

Part 1—Section A " Continuous plate "
Section B " Non-continuous plate "

Part 2—Section A " Continuous sheet "
Section B " Non-continuous sheet " (i.e., hand mill)

Part 3—Section A " Hot-rolled strip "
Section B " Cold-rolled strip "

Part 4—" Stainless and heat-resisting plate, sheet and strip "

Dimensions of screw lamp-caps and lampholders (Edison-type) (revision of B.S. 98)

Preservative treated plywood

It is proposed that the standard will cover plywood treated with preservatives against fungal and insect attack, the treatment being applied either to the plywood after manufacture or to the veneers before assembly.

Asphalt tiles for paving and flooring (natural rock asphalt) (revision of B.S. 1324 : 1946)

Asphalt tiles for paving and flooring (mineral aggregate with no inherent bitumen) (revision of B.S. 1325 : 1946)

Black pitch mastic flooring (revision of B.S. 1450 : 1948)

Coloured pitch mastic flooring (revision of B.S. 1375 : 1947)

Coloured pitch mastic flooring (incorporating lake asphalt and bitumen) (revision of B.S. 1783 : 1951)

Correspondence

28*th June*, 1960

The Editor.

DEAR SIR,

The Practical Aspects of the High Pressure, High Vacuum Sterilizers used in Hospitals

I was most interested in the paper, but wish to comment upon the authors' remark that hydraulic and drill tests on sterilisers are a nuisance and time-absorbing. Safety in operation of steam pressure plant at all times and under all conditions of service is of paramount importance to both the hospital engineer and the insurance company concerned. The potential dangers of such plant are well-known and appreciated and, in the event of an official enquiry after an accident, the actions of both the hospital engineer and the insurance engineer surveyor would be scrutinised in close detail.

Due to constructional features, the jacket surfaces in way of the steam spaces are inaccessible for close visual examination, and periodic hydraulic tests are most valuable in order to determine effectiveness of the stays, etc.

Drill testing is necessary in order to ascertain with certainty the remaining jacket thicknesses, especially when a smooth wastage is progressive, and to facilitate calculation of the maximum permissible safe working pressure for the structure having regard to all the conditions and factors prevailing. It is possible, of course, that non-destructive thickness tests by electronic devices will eventually reduce the need for drill tests, apart from exceptional circumstances.

Yours faithfully,

E. R. F. LEE.

41, Beaulieu Drive,
Pinner, Middlesex.

On the Market

A Review of new equipment and materials and their development

" NOISELESS " DUSTBIN

A new dustbin designed to reduce handling noise to a minimum has been introduced by **Bradley and Co. Ltd.**, of Albion Works, Bilston, Staffs.

It is of galvanised iron construction in the well-known B.S.S. taper pattern and has a heavy rubber ring incorporated in the bottom. Known as the " Beldray " N.A. bin, it is available in 2, 2½ and 3¼ cu. ft. capacities. The all-rubber lid can be removed and replaced with scarcely a sound.

NEW SEMI-ROTARY PUMPS

General Trade Equipment Ltd. of 82-90 Seymour Place, London, W.1, have extended the range of their " Rotodynamic " hand pumps and these now cover deliveries up to 150 gallons per minute at 5 ft. head and can achieve a combined suction and delivery head of 75 ft.

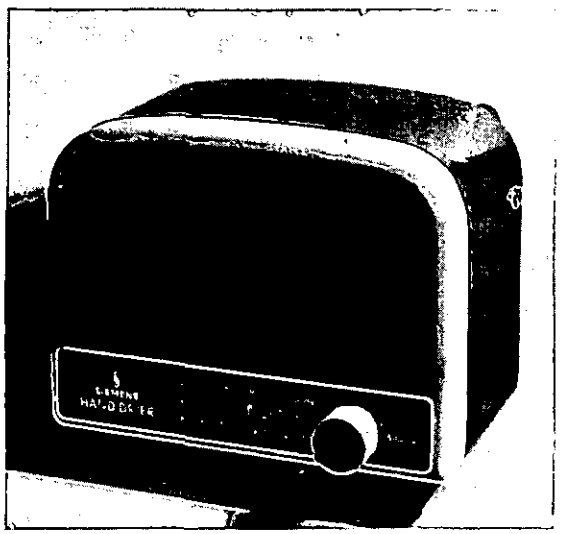
As can be seen from the illustration, the pumps are of neat design, light and portable, and prices range from £24.

SIEMENS HAND DRIERS

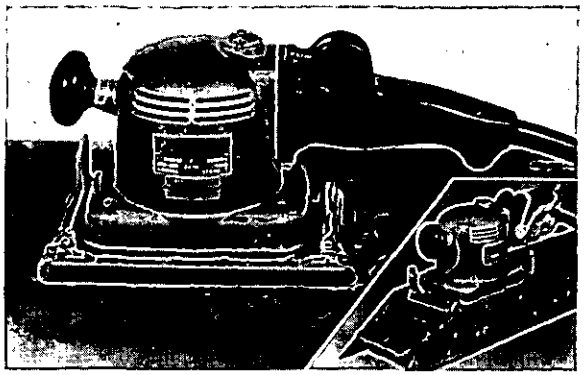
The **G.B. Electrical Co.** advise us that they have been appointed distributing agents for the MT 3 Hand Drier manufactured by Siemens-Electrogerate A.G. of Berlin-Munchen.

The MT 3 is only 7·2 in. × 9·6 in. × 6·2 in. and weighs just under 9 lbs. It is intended for wall mounting and has a motor rating of 50 watts and heater rating of 1,600 watts. It is claimed that drying takes 30 to 40 seconds and the machine automatically shuts down after 50 seconds. It is operated by depressing the starting button on the front. Cost is £14 19s.

Further details from 36, Renfrew Road, S.E.11.



The Siemens Hand Drier.



The " ELU " type M.V.S. 17/W Orbital Sander.

NEW ORBITAL SANDER

The type M.V.S. 17/W Sander in the " ELU " range of wood-working machines has no normal armature, but incorporates a continuously rated induction motor. The most impressive advantage, therefore, is the extremely low cost of maintenance.

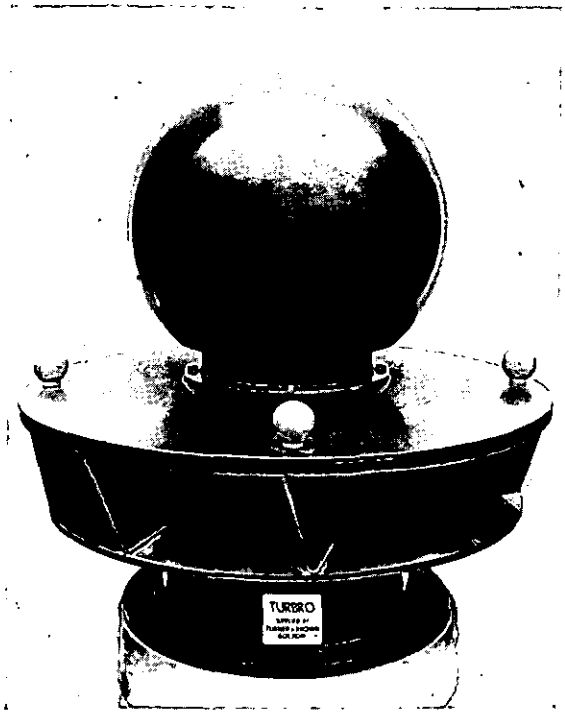
The " ELU " Sander is mounted on water-tight rubber mountings which seal the mechanical parts from water and grit, thus it can be used dry or wet, with special waterproof sanding papers provided for the latter purpose. Normal backing for the sanding papers is foam rubber, but pads of bristle (for polishing) and wire bristles (for de-rusting), are interchangeable for these applications. The 250-watt motor gives a bigger reserve of power than is normally needed, and so it is more resistant to the type of mis-use often experienced on building sites.

An automatic self-starting switch brings the induction motor into operation, and when the motor is running free it is so quiet as to be scarcely audible.

The sanding area is 4½" × 8"; the weight is 7½ lbs., and the price is £22. Delivery is from stock from **Trend Industrial Equipment Ltd.**, 77 & 95, Dudden Hill Lane, N.W.10.

NEW " TURBRO-DYNAMIC " RADIAL P.V.C. FUME FANS

An interesting advance in fan design has been accomplished by **Turner & Brown Ltd.**, and **Matthews & Yates Ltd.**, with the announcement of their new range of " Turbro-Dynamic " P.V.C. Radial Fans, the use of which eliminates unsightly ducting, discharge connections and weather cowls.



The new range of " Turbro-Dynamic " Fans.

" Turbro-Dynamic " fans are supplied in 6 different sizes, 10", 12½", 15", 17½", 20" and 25", they are manufactured from Rigid Unplasticised P.V.C. (grey colour) but pastel shades can be supplied at extra cost. The use of metal has been restricted to the motor and stainless steel holding down bolts.

The sphere on top of the fan contains the motor, a feature of this design is special ventilation to ensure non-overheating of the motor during warm weather.

Installation is simple, since the connection at the base of the fan can be supplied to suit customers' ducting.

" Turbro-Dynamic " fans are said to have a high performance, low current consumption and be completely resistant to all chemical fumes and corrosive gases and inclement weather.

Further details may be obtained from the manufacturers: Turner and Brown Ltd., Davenport Works, Bolton, or Matthews & Yates Ltd., Cyclone Works, Swinton, nr. Manchester.

FILTERS FOR DARK-ROOM WATER SUPPLIES

In order to obtain good quality results in photographic and X-ray processing, it is essential that the water used should be entirely free from solid particles which can cause blemishes on films and plates. The presence of foreign matter in water is not always easy to detect but an efficient safeguard against damage by this cause can easily be obtained by filtering all water used for processing purposes.

A fast flowing filter such as the Berkefeld model PH is designed for rapid connection to the supply pipe and for operation at normal supply pressure. This unit consists of a cast metal cylinder vitreous enamelled inside and out which contains a special photographic-type filter element in the form of a finely perforated nickel-plated cylinder covered by a cloth filter bag. The inlet control valve can be fitted on either side of the filter body and the outlet tube can be swivelled to any position. All metal parts are chromium plated and a metal bracket is provided for wall mounting.

The filter bag is easily accessible for cleaning purposes as only two wing nuts have to be unscrewed. It is quickly removable and will stand repeated cleaning.

This compact filter, which has a height of only sixteen inches and a diameter of five inches, will yield 80 gallons of pure water per hour at an input pressure of 70 lbs. p.s.i.

For large installations Berkefeld type PP filters are available in a range of units which can provide from 200 gallons to 500 gallons per hour. They can be arranged in batteries to provide up to 5,000 or so gallons per hour.

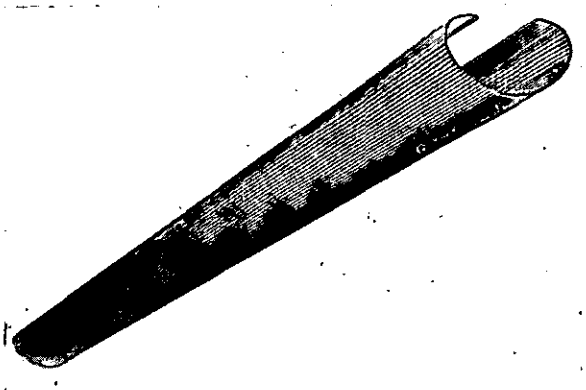
The equipment is manufactured by **British Berkefeld Filters Ltd.**, Sardinia House, Kingsway, London, W.C.2, from whom full details may be obtained.

CLIP-ON DIFFUSER FOR FLUORESCENT FITTINGS

A simple clip-on diffuser that transforms a bare 5 ft. fluorescent batten into an attractive lighting fitting is made by **Siemens** (A.E.I. Radio and Electronic Components Division), 38/39, Upper Thames Street, London, E.C.4.

This unit (Catalogue No. 18/8) is made of reeded Diakon and sells for £2 13s., plus 9s. 9d. purchase tax. Diakon shares, with reeded Perspex, high light transmission properties and stability in all atmospheric conditions.

The diffuser is fitted with two nickel plated spring clips which will push onto and grip a 1½ in. diameter



Siemens Ediswan translucent diffuser for clipping on to bare 5 ft. fluorescent battens.

fluorescent lamp to hold the diffuser in position. It can therefore be easily removed for washing in soap or detergent suds, or for gaining access to the lamp and fitting.

NEW HEATING ELECTRODE

A new electrode, Thermees, for applying a rapid and concentrated heat to metal before welding, bending or straightening, is announced by English Electric.

The electrode may be used on any standard metal and in any position. Heat can thus be applied in an exact spot and in normally inaccessible places without any special flame or induction heating equipment.

Thermees is handled like a normal electrode and requires no special equipment or technique. It can be used on A.C. or D.C. welding plant. For best results the A.C. supply should have an open circuit voltage of 80 to 85 volts.

Temperature rise of the metal is regulated by the rate of travel and number of passes of the electrode. Any residual scale or oxide can easily be brushed off to leave the surface clean.

Thermees has been developed and is marketed by the Welding Electrode Division of **English Electric** at Accrington.

NEW FOOD SLICER

The Avamore Engineering Co. Ltd., of Denham, Bucks., have introduced a light weight gravity feed slicer which is constructed of light alloy and gives fifteen feed variations. The finish is polished anodised.

The steel blade is belt driven from a ¼ h.p. motor. A built-in switch is fitted. The model is known as the "Two Five" and, weighing 51 lbs., it is light enough to be stored away when not required. A grinding unit is available as a separate attachment. The price is £79 10s.

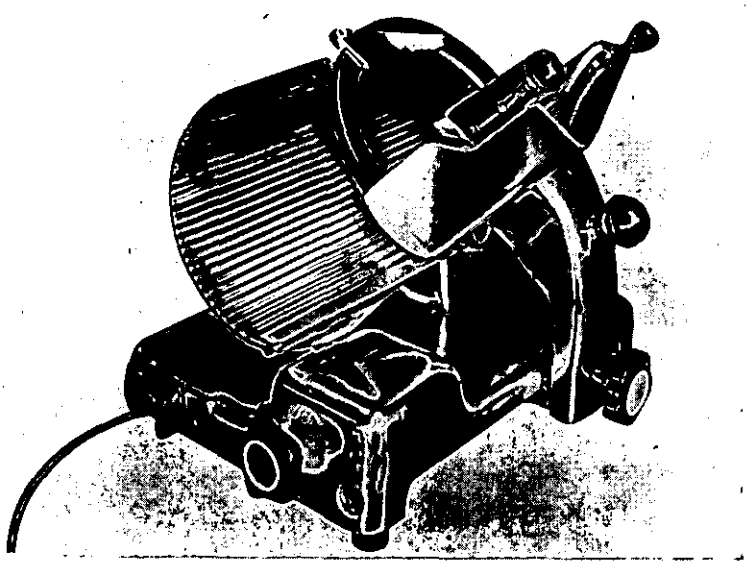
NEW "MEGGER" INSULATION AND CONTINUITY TESTER

The new Series 3 "Megger" instrument just put on the market by **Evershed and Vignoles Ltd.**, of Acton Lane, Chiswick, W.4, incorporates many advanced features. A true ohmmeter movement makes any adjustment before use unnecessary, and simplifies operating procedure.

In addition to the insulation testing range, the instrument now operates over a continuity range from 0-100 ohms with a scale shape which permits readings as low as 0·1 ohm or even fractions of this by interpolation. The continuity testing voltage (4 volts) is obtained from a new and very advanced miniature generator so that no battery is required and constant readiness for use is ensured.

The new instrument is in a case of identical shape and size to its predecessor, but manufactured in a stronger, impact resistant material. The change-over from "continuity" to "insulation" ranges is by a slider switch recessed in the side of the instrument. A fuse which, with its spare inserts, is accessible from the base of the tester, protects the movement when it is used for continuity measurements.

Three ranges of the instrument are available, the 500 volt testing pressure version covering 0-100 megohms and infinity on the insulation range and 0-100 ohms on the continuity range: the 250 volt version 0-50 megohms and infinity and 0-100 ohms; and the 100 volt version 0-20 megohms and infinity and 0-100 ohms. A full description of the new instrument and of the technical design considerations underlying it, is available on request from Evershed & Vignoles Ltd. There is also an illustrated leaflet (No. HC. 327) which has just been published.



The Avamore "Two Five" Slicer.

" NEW LOOK " POLYSTYRENE TELEPHONE

A new telephone, styled to meet the demands of modern taste and design, is now being manufactured by **Autophone Ltd.**

The phone, named the " Aristocrat " FL.50, is available in five basic colours—dawn grey, olive green, black, ivory, sand beige. Handsets can be interchanged, however, so that two tone finishes are available.

The " Aristocrat " is moulded in Styron 475 polystyrene. The handset cradles easily in the hand and a coiled extensible cord prevents kinking. The cord is only twelve inches in the " rest " position but when in use it stretches to over four feet.

Both the volume and tone of the bell can be adjusted so that a high or low pitched ring can be obtained. Each gong has a separate tone so that by adjustment the telephone will ring on one gong only. Moreover, both gongs can be isolated so as to produce a buzzer effect. These variations enable any one of three telephones in the same room to be easily identified.

Enquiries to Autophone Ltd., Autophone House, 73, Great Peter Street, London, S.W.1. Tel.: Abbey 6242.

SOLID CISTERN FLOAT

Expanded Plastics Ltd., of Mitcham Road, Croydon, have introduced the Polyzote solid cistern float.

An obvious advantage of the Polyzote float is that, being solid, it cannot fill with water. In addition, it will not rot or corrode. Apart from being unsinkable, it should last indefinitely.

Polyzote is an expanded plastic, and consists of innumerable tiny, closed cells. Since these cells do not connect, the material retains its buoyancy even if it is damaged by being penetrated by a sharp object.

The Polyzote float is 4½ in. diameter. Fitted with $\frac{5}{16}$-in. Whitworth thread, it will fit any standard cistern. It has been accepted by the British Waterworks Association and complies with BSS 2456. The moulded float is spherical; it has a smooth, well-finished surface.

LUBRICATOR FOR SELF-LEVELLING GREASES

A new grease lubricator, the " SG," is introduced by **Wakefield-Dick Industrial Oils Ltd.**

The " SG " is a positive action lubricator designed specifically for the pumping of self-levelling greases. It shows a considerable first cost saving against all-purpose grease lubricators which are necessarily more complicated in design.

The new lubricator is compact but robust, has a grease capacity of 8 lb., and is fitted with up to 6 outlet connections. It can be supplied with a plain drive shaft, or the drive can be arranged through a sprocket, pulley or ratchet. Alternatively, the lubricator can be fitted with its own worm or ratchet reduction gearbox in order to take advantage of higher driving speeds.

A complete installation, comprising the lubricator directly coupled to a fractional h.p. geared motor and mounted on a mild steel baseplate, can also be provided.

Where non self-levelling greases are to be handled, the appropriate Wakefield-Dick lubricator is the " 52G."

Further details of both lubricators can be obtained from the Mechanical Appliances Department, Wakefield-Dick Industrial Oils Ltd., Castrol House, Marylebone Road, London, N.W.1.

NEW " DAFILE " PRODUCT

Dafiles Ltd., 37, Sheen Road, Richmond, Surrey, manufacturers of Tension Files and allied tools, announce a further addition to their range of Industrial and Retail Products.

Their new product has been designed to fit the normal coping saw frame which, with its characteristic deep bow and light weight, is undoubtedly the ideal profiling medium. The blades will be known as Dafile Coping Saw blades, they are circular section with teeth all round.

In common with the majority of Dafile products, their Coping Saw Blades will cut all materials in common use including steel, brass, copper, plastics, hardboard, plywood, etc.

PACKAGE BOGIES

To meet the increasing demand for an efficient method of manhandling heavy loads, **General Trade Equipment** is now marketing a new line of four-wheeled bogies.

The smaller model costing 57s. 9d. (carriage 3s.) has a capacity of 5 cwt. and is 19 ins. long and 18 ins. wide.

The larger bogie which will carry weights up to one ton measures 24 ins. by 24 ins., has 3 ins. diameter wheels and costs £6 5s. 9d. (carriage 5s.).

Both models are made of steel and the double ball-bearing wheels are machined from solid steel bar.

The right-angled support platform is drilled with four holes for permanent fixing if desired.

Available from General Trade Equipment Ltd., 82-90, Seymour Place, London, W.1 (PADdington 3456).

NEW STELLA REPRESENTATION FOR SCOTLAND AND NORTHERN IRELAND

Stella Lamp Co. Ltd. announce the appointment of Mr. J. M. Anderson as their sales agent for Scotland and Northern Ireland.

Mr. Anderson, who is very well known in the electrical industry, was, until recently, Regional Manager in Scotland and Northern Ireland for the A.E.I. Lamp and Lighting Co. Ltd.

MANLOVE BOARD APPOINTMENT

Mr. E. S. Hale has been appointed to the Board of Manlove Alliott and Co. Ltd. as Sales Director.

Apart from his service throughout the war in R.A.F. Bomber Command, Mr. Hale has been with the Company since 1938. During this time he has served as an area sales representative in the South West and the Midlands, and as Sales Manager since 1958.

A member of the Council of S.L.E.A.T., Mr. Hale is a Rugby football enthusiast and golfer but apparently has a strong distaste for gardening!

Notes for Members

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

OBITUARY

Mr. C. G. Batty

We regret to announce the death in Leicester City General Hospital of Mr. Cyril George Batty at the early age of 33. He leaves a widow and two young children.

Mr. Batty served an apprenticeship at the Hunslet Engine Co. Ltd., Steam and Diesel Locomotive Builders, after returning from war service. He also obtained a City and Guilds Certificate in Production Engineering and a First Class Full Technological Certificate at Leeds College of Technology. He obtained the Ordinary National Certificate in Mechanical Engineering at Wakefield College of Technology in 1956/57.

After a period as a Maintenance Fitter at Seacroft Hospital, Leeds B Group, he was appointed Assistant Engineer at Clayton Hospital, Wakefield, in 1955. In 1957 Mr. Batty was appointed Senior Engineer at Leicester Royal Infirmary and held this appointment at the time of his death.

YORKSHIRE BRANCH

A Meeting of the Branch was held at the Scalybore Park Hospital, Burley in Wharfedale, on Saturday, July 9th.

After the Meeting had stood in silence as a tribute to the memory of the late Mr. Cyril G. Batty, a former member of the Branch, the Chairman introduced Mr. K. Holdsworth, A.M.I.Plant E., of the Riley International Combustion Products Co., and he read a paper entitled "The Application of Mechanical Stokers." This was an interesting paper, particularly in the light of the Clean Air Act, and the speaker covered the range of mechanical stokers, instancing the advantages and disadvantages of each type as he proceeded. A discussion followed.

In the Branch Business section which followed, Mr. J. D. Lewis gave a full report on the proceedings of the Council Meeting at Harrogate and followed this with a report on the Special Council Meeting, held in London on July 2nd, which had been especially convened for the purpose of considering salaries and conditions of service for engineers, and had arisen as a result of decisions taken at the Annual General Meeting. It became evident that a number of those present considered that no progress had been made and that we were no further ahead than before the A.G.M. Mr. Lewis, however, did not agree with this view, and said that, by the time the next Meeting of Council was held, which would probably be some time in September, more definite plans would be available. In spite of this, it was quite obvious that several persons were disappointed at the results so far.

After some considerable time, the Chairman decided that no useful purpose would be served by further extending the debate, and he strongly recommended that members await the outcome of various investigations which Council had decided should be made.

SOUTHERN BRANCH

The March Meeting of the Southern Branch was held on the 19th at Moorgreen Hospital, West End, Southampton. Arising from the previous meeting, it was announced that arrangements for the Branch Annual Dinner had been completed, and that this took place at the Polygon Hotel, Southampton, on April 2nd.

A paper on "Modern Steam Trapping as applied to Hospitals and Laundries" was given by Mr. Chandler of Spirax-Sarco Ltd. Members took part in the ensuing discussion which, as well as the paper, was of very considerable interest and practical value.

The rest of the Meeting was taken up with business matters, chiefly concerned with the one day Course arranged to be held at Southampton University, and with arrangements for the Four Branch Meeting at Oxford, both of which have been reported elsewhere in this Journal.

WEST OF ENGLAND BRANCH

A Meeting of the Branch was held at Kenny Hill Hospital, Gloucester, on Saturday, April 30th. Members met at Barnwood Hospital prior to the Meeting to visit the Boiler House, which is fully automatic and, as a result of Mr. McBurney's report at the previous meeting, a demonstration had been arranged to show all the necessary tests to ensure that the equipment was working satisfactorily. On completion of the tests, the boilers were blown down to cause a lock out and sound the alarm. The photo-electric cell was removed to cause the lock-out and the boiler run down until it cut itself out with the pressurestat. After the demonstration many questions were put to Messrs. Smith and McBurney, the Chief and Deputy Chief Engineers respectively, and precise explanations were given. The Branch wished to record their appreciation for the great trouble to which these two gentlemen went to ensure that the visit was the success that it was.

The remainder of the Meeting was devoted to domestic matters and Mr. Adams gave a short discourse on the results of the Arbitration Court award. He regretted that we had not had much success, but stated that the position was now being reviewed in the light of the results, and hoped for better things in the future. Various other matters were discussed relating to the Oxford Meeting and to the Annual General Meeting.

NORTH EASTERN BRANCH

At the Meeting on March 1st, which was held at the Liberal Club, Newcastle upon Tyne, members heard a talk " The Case for Coal " by Mr. Blacklock, a fuel technologist of the National Coal Board. During the discussion which followed, it was obvious that the N.C.B. had a great deal of scope to improve the quality of and the supply arrangements for their product.

During the meeting which followed, Mr. Ritchie referred to the poor attendance at meetings latterly. He suggested that a better attendance might be obtained if meetings were held less frequently. It was therefore decided that meetings should be held every second month only, and, if possible, should coincide with the presentation of a Council Report. It was also decided that no meetings would be held during the months of June, July and August. It would be desirable to arrange for some item of interest, such as a lecture, a debate or a visit to be arranged for each meeting, and the Secretary was instructed to formulate a programme. It was also decided to continue to hold meetings on Saturday afternoons.

The May Meeting of the Branch was held on the 6th, also at the Liberal Club, Newcastle upon Tyne.

Before the commencement of the Meeting, a joint function was held with the Association of Hospital Superintendent Engineers to mark the occasion of Mr. O. Ritchie's retirement from the Hospital Service. Mr. J. Blagburn, on behalf of the members of both Associations, presented Mr. and Mrs. Ritchie with an hors d'oeuvre set.

Mr. Ritchie, in accepting the gift, expressed his regret at leaving the Service and stressed the good will and co-operation he had always found among his colleagues.

The Secretary referred to the previous discussion in regard to the holding of a Ladies' Day and Branch Dinner, but reported that a poll of members had produced a poor response and it was agreed, therefore, not to proceed any further with the idea.

A Meeting of the Branch was held on June 25th at the Liberal Club, Newcastle upon Tyne.

The Meeting was chiefly concerned with the report of the Member for Council upon the June Council Meeting and the deliberations at the A.G.M. He referred in particular to the motion which had been approved regarding the choice of an alternative method of handling conditions of service and salaries, and stated that a special meeting of Council would be held in London in July to consider the implications arising therefrom and the ways and means of implementing it. A lengthy discussion took place and the general feeling of the Branch was that, whatever might be said in favour of the proposal, it contained considerable dangers, and on the whole the Branch felt disinclined to support it.

In view of the importance of this meeting it was decided that a Meeting of the Branch should be held in July to discuss the outcome.

MIDLAND BRANCH

The Branch on July 8th visited the Drayton Regulator and Instrument Co. at West Drayton, Middlesex. A report of this visit appears elsewhere in this issue.

MID-SCOTLAND BRANCH

We have been informed that the Mid-Scotland Branch is intending to hold a weekend school on the 16th, 17th and 18th of September, 1960, in the Aylsor Hospital, Ayre, when it is hoped to have five interesting papers read. A school fee of 10s. will be charged and an invitation to attend is open to all Members of the Institution, many of whom, it is hoped, will feel inclined to spend part of their annual leave in this delightful seaside resort. If they are unable to be present at each lecture, they might feel disposed to attend some of them. Any member who is interested should contact the Secretary of the Mid-Scotland Branch, Mr. J. Panton, at 8, Bellefield Avenue, Dundee, as soon as possible, and each of the Scottish members will be circularised individually.

PERSONAL

We learn that Mr. L. F. Gatzias, who is at present Superintendent Engineer of St. Edward's Hospital, Cheddleton, has been appointed Superintendent Engineer to the Tottenham Group of Hospitals.

Mr. R. G. Allister has been appointed Senior Engineer of St. Luke's Hospital, Huddersfield. Mr. Allister was formerly Senior Engineer at St. Luke's Hospital, Bradford.

The new Senior Engineer at Addenbrooke Hospital, Cambridge, is Mr. G. H. Whyte. He was previously Assistant Engineer at the Radcliffe Infirmary, Oxford.

(Continued on page A.14)

(*Continued from page 168*)

WELSH BRANCH

The Week-end School, which has been so successfully established by the Welsh Branch over the last few years, will be held this year on the 24th and 25th of September at the Osborne Hotel, Langland, Swansea.

We have been asked to emphasise that members of all branches will be made very welcome. Those wishing to attend should send an application as quickly as possible to the Hon. Secretary, Mr. H. F. H. Dolling at 8, Lon Coed Parc, Sketty, Swansea, enclosing the registration fee of 10/–.

The provisional programme is as follows:

FIRST DAY—SATURDAY, 24th SEPTEMBER

10.00 a.m. Official Opening
by H. A. Sandford, Esq., M.A., F.G.S., M.I.Mech.E., M.I.E.E., M.I.H.V.E., M.Cons.E.

10.15 a.m. Lecture: "Problems in the burning of sulphur bearing fuels in oil fired boilers, with reference to recent developments."
by H. N. Wigan, M.C., M.Inst.Pet.

11.00 a.m. Coffee.

11.30/12.15 p.m. Question period.

Luncheon

2.30 p.m. Lecture: "The Thermal Storage Steam Boiler."
(Lecturer to be arranged)

3.15 p.m. Question period.

4.00 p.m. Tea.

SECOND DAY—SUNDAY, 25th SEPTEMBER

10.15 a.m. Lecture: "The Use of Light Alloys and Stainless Steel in the manufacture of Hospital Equipment." (*Including reference to special medical equipment*)
by G. W. Maynard.

11.00 a.m. Coffee.

11.30/12.15 p.m. Question period.

Lunch break

2.30 p.m. Lecture: "Corrosion problems in Boiler Plants."
(Lecturer to be arranged)

3.15 p.m. Question period.

4.00 p.m. Tea.

End of Conference

BRAITHWAITE APPOINTMENTS

Isaac Braithwaite & Son Engineers Limited announce that as from May 31st, 1960, the following have been appointed Technical Representatives as additions to the Ibis Selling Organisations:—

Mr. G. E. Lay has been appointed to the London office (200, Upper Thames Street, E.C.4) under the direction of Mr. G. D. Petts.

Mr. C. E. R. Mecrate-Butcher has been appointed to the Nottingham Office (112, Lower Parliament Street) under the direction of Mr. C. G. Dear.

Mr. J. Hellowell has been appointed to Manchester office (Lloyd's House, 22, Lloyd Street, Manchester, 2) under the direction of Mr. F. M. Johnson.

Mr. H. G. Johnson has been appointed to Glasgow office (68, Bath Street, Glasgow, C.2) to operate in conjunction with Mr. H. T. Keen under the direction of Mr. F. M. Johnson.

As previously announced the Area Directors will continue to direct the IBIS Sales organisation from the various Area Offices.

STOP PRESS

SITUATIONS VACANT

BURNLEY & DISTRICT HOSPITAL MANAGEMENT COMMITTEE
BURNLEY GENERAL HOSPITAL

SENIOR ENGINEER, salary £765 rising to £910 per annum. Applicants should have had previous experience in a supervisory position in a hospital or similar institution and have a sound knowledge of the principles and practice of the efficient operation and maintenance of boilers, engines, electrical equipment and other plant (including d.c. generating plant and laundry machinery).

Applications stating age, qualifications and experience together with the names and addresses of two referees to The Group Secretary, Burnley General Hospital, Burnley, not later than 27th August, 1960.

THE HOSPITAL ENGINEER

PUBLISHED MONTHLY
AT 45, GREAT RUSSELL STREET,
HOLBORN, W.C.I.
Telephone: MUSeum 0131/2

Available to non-members by subscription at 32s. 6d. per annum post free in the U.K. Single copies 2s. 6d., postage 6d. extra.

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