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Editorial

THE report of the Royal Commission on Doctors' and Dentists' Remuneration* was published at the end of last month. That the Commission have issued a total of over 42,000 questionnaires to professional men in various walks of life, as well as a further seven-and-a-half thousand to those in industry, the services, etc., is some indication of the lengths which have been sought to obtain a fair basis for their recommendations. A table of earnings is given in the report for the average total over an employment period of thirty-five years for a number of the professions investigated, and this in itself makes somewhat surprising reading. (As might be expected the professional engineer is well down the scale!)

We would not presume to comment upon the Commission's recommendations as to salaries, either as a whole or as between those in hospitals and those in general practice. There are other aspects of the report, however, that do call for comment. To begin with the Committee rejects as obsolete the Spens theory that doctors should be protected against the trends of economic change and be guaranteed some permanent standard of living regardless of every outside influence. Instead it is recommended that a standing review body should be set up, consisting of seven eminent and experienced persons, to advise the Prime Minister on major matters of doctors' and dentists' remuneration. It is considered that this is the only satisfactory way of achieving three principal aims—the avoidance of public dispute in the settlement of remuneration, some insurance against the effect of political expediency, and some protection for the taxpayer against doctors' and dentists' earnings rising above a reasonable level. It is further emphasised that the Review Body's advice must not normally be disregarded, i.e. " the recommendations of the Review Body must only rarely and for the most obviously compelling reasons be rejected." It is proposed that the body should make recommendations on its own initiative or when requested by the Government or the professions through the Government. In order that it should have adequate accurate information upon which to base its advice, any information that it might require about professional earnings generally should be made available to it by the Board of Inland Revenue.

In the light of the experience of other sections of the professional staff of the Health Service of the failure of Whitleyism, why limit the scheme to doctors and dentists? They are by no means the only ones who have been the victims of political expediency. This is an excellent scheme and it should be applied to all senior professional staff in the Service.

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*Cmd. 939. H.M.S.O. Price 15s.

Water Supplies

By O. E. ROTHEROE

The Author, who is Chief Inspector of the City of Birmingham Water Department, acknowledges that his department has certain problems that are not necessarily common to all similar authorities. In this paper he covers practical applications of bye-law requirements in respect of hospitals and points out that they are similar to the Government's Model Bye-laws which have been adopted by many water undertakers.

IN the course of my everyday duties as an Inspector with the City of Birmingham Water Department, I am concerned primarily with the practical application of byelaw requirements and it is with this aspect in mind that I have prepared this Paper. Whilst I shall deal specifically with only some of the Department's byelaws, I would point out that fundamentally they are the same as the Ministry of Housing and Local Government Model Byelaws (Water) Series XXI, 1954 Edition, for the prevention of waste, etc., which have been adopted by many water undertakers.

The primary object of the Model Byelaws is to promote uniformity throughout the country. Whilst this is generally acknowledged as being most desirable in order to eliminate as far as possible the difficulties which face consultants, engineers, architects and plumbers, there exists good reason for variations in certain respects. As the characteristics of the water in supply vary considerably from that of its neighbours, I appreciate that the restrictions placed by the City of Birmingham Water Department on the use of certain materials could not possibly apply in areas under the jurisdiction of other water undertakers. I trust that the information I hope to convey to you will at least be of interest. In any event, the common aim of water undertakers should be to enforce good byelaws by which waste of water may be restrained through the restrictions placed on the use of inferior fittings and insistence upon the installation of good quality reliable fittings, and to maintain the high quality of water in its mains by their correct installation.

The bulk of water in supply in the Birmingham statutory area is collected from the gathering grounds of the Elan and Claerwen Valleys in Wales. It is upland surface water and is extremely soft and slightly acid. It readily corrodes unprotected ferrous materials. The water flows by gravity from Wales to the Frankley Works, situated on the south west boundary of the City, where it is treated before release to the distribution system, which comprises well over 2,000 miles of mains varying from 3 in. to 60 in. in diameter. There are five principal zones of supply, covering the statutory area of approximately 194 square miles. The average daily consumption is within the region of 60 million gallons which represents a consumption of about 50 gallons per day per head of the population.

In addition to the foregoing, bulk supplies taken by the neighbouring undertakings of South Staffordshire, Coventry, Nuneaton, East Worcestershire and Stratford-on-Avon account for about five million gallons per day. Pressures obtained within the area of supply vary between 15 lbs. per square in., about 35 ft. head, to 150 lbs. per square in., about 346 ft. head.

The Department's current byelaws came into force in June 1955 and comprise a total of 63 clauses which include reference to no fewer than 29 British Standards Specifications and one Code of Practice. British Standards are regarded as being a distinct asset, since, in addition to creating a measure of uniformity, it tends to ensure that the quality of the material is maintained at not less than the specified minimum. The inclusion of the Code of Practice C.P.99 (1956), Frost Protection for the Water and Sanitary Services in Buildings, is an innovation so far as Water Byelaws are concerned. This Code suggests that there are three general principles to follow when considering protection, namely location of fittings, installation and provision of stop valves, and drainage facilities. Of the total of 63 laws, five deal with interpretation and application and are therefore explanatory of the remainder.

Fourteen deal with the materials of pipes and fittings, specifying quality and strength through the various British Standards. Six specify standard of support and protection for pipes and fittings. One provides that fittings within a building shall be readily accessible. Three provide for the fixing of stop taps specifying the positions. Eleven are measures to safeguard against contamination. Fifteen are specific measures against waste, such as the provision of ball valves to cisterns, warning pipes, capacity of flushing cisterns, the provision of plugs to sinks, lavatory basins and baths, and disconnection of unneeded pipes. Four are measures to safeguard consumers against risk of injury to themselves or

A paper read before the Midland Branch of the Institution.

their appliances, such as heating appliances, etc. One states that at least one draw-off tap for drinking water shall be provided on the service pipe in every house. Two provide that notice of installation or alteration of fittings shall be given to the undertaking and, finally, Byelaw 61 deals with penalties.

I have selected a number of byelaws which from experience I have found, due to circumstances such as the restricted use of certain materials, misinterpretation of byelaw requirements and misunderstanding, have resulted in consumers and others becoming involved in considerable trouble and unnecessary expense in order to regularise fittings which have been at variance with byelaw requirements. It is regarded by many engineers as being unfortunate that the use of words such as " reasonable," " readily," " adequately " and " practicable " exist in connection with certain byelaws, especially when tests of validity of interpretation arise.

Byelaw 2

This byelaw can in effect be divided into two parts.

Part 1

Where any requirement appears in a byelaw to the effect that the fitting shall comply with the British Standard, example " British Standard 1010 " —bib, pillar, globe and stop taps; or British Standard 1212 Portsmouth pattern ball valves, etc., the undertaker can only apply those paragraphs of the Standard as are concerned with the size, nature, materials, strength and workmanship of the fitting. Thus, departure from the Standards in other respects are permissible provided such departures do not adversely affect the efficiency or suitability of the fitting in relation to the purpose for which the byelaws are made, that is, for the prevention of waste, misuse, etc. The basic object of this latitude is to permit the acceptance of fittings embodying improvements.

Part 2

The byelaw does not therefore restrict the choice of fittings to those manufactured to British Standards, but any fitting, other than that which complies with the British Standards, must be—

(i) as efficient as the British Standards

(ii) not be likely to permit waste, undue consumption, misuse, erroneous measurement, contamination of water or reverberation in pipes and

(iii) made of corrosion resisting alloy.

Example. One manufacturer supplies in connection with certain types of sterilizing equipment, controlling screw down pattern valves which in all respects are not inferior to, and in some respects are superior to, the British Standard 1010, and as such are accepted by the Department for installation within its area of supply.

Byelaw 3—Application of Byelaws

In view of the importance of this byelaw I propose to quote it in its entirety—

" A person shall not, for the purpose of conveying, delivering, receiving, or using water supplied by the undertakers—

(*a*) Use any water fitting which is of such a nature or is so arranged or connected as to cause or permit, or be likely to cause or permit waste, undue consumption, misuse, erroneous measurement or contamination of water or reverberation in pipes.

(*b*) Use any water fitting which is not in accordance with such of the particular requirements of these byelaws as may be applicable to it, nor

(*c*) Arrange, connect, disconnect, alter or renew any water fitting in contravention of any requirement of these byelaws."

It has been said that this byelaw could be employed to over-ride any other byelaw. Under this byelaw, the use of any fitting or arrangements of fittings which are not in accordance with the specific requirement of the byelaw or are likely to cause waste, misuse, etc., can be prohibited. The Department have, currently, under the requirements of this byelaw coupled with Byelaw 31, taken action in respect of certain installations in both industrial concerns and hospitals where irregular connections between service and distribution pipes have existed. In several cases, the installations have been in existence for many years and presented a grave risk of contamination of the private supply system and also the Corporation's supply. In one particular case, the Department experienced considerable difficulty in isolating a section of its main. Investigation revealed that due to a cross-connection between a distribution pipe and service pipe coupled with a faulty fitting, water was being drawn into the Department's main from an elevated tank which served a fire sprinkler installation. In spite of the fact that the premises were regarded as a serious fire hazard, under the provisions of this byelaw, immediate disconnection of the service pipe from the offending installation was insisted upon.

Byelaw 6

This relates to pipes of lead and lead alloy. Due to the pressures that obtain within the area of supply, coupled with experience gained over the years with these particular types of pipes, it is now a requirement of the Department that lead and lead alloy service pipes shall conform to Table 1C of the appropriate British Standards specification, that is in the case of lead pipes $\frac{1}{2}$ in. $\times$ 9 lbs., $\frac{3}{4}$ in. $\times$ 15 lbs., 1 in. $\times$ 21 lbs. per yard, etc.

Byelaw 10—Pipes of Cast Iron or Asbestos Cement

Cast iron or asbestos cement pipes must conform to the dimensions given in Class D, Table 1 of the specifications referred to, that is—

Cast iron (vertically cast)—B.S. 78 : 1938

Spun Iron—B.S. 1211 : 1945

Asbestos Cement—B.S. 486 : 1933

Due to the aggressive nature of the water in supply on iron or steel, and in order to prevent internal corrosion of pipes with a consequent risk of contamination and waste of water (Byelaw 3), all cast iron pipes must be lined with concrete or effectively protected by some other suitable means. Experience has proved that the normal thin bituminous coatings do not provide effective protection. Over the past 25 years concrete lining has proved to be effective in preventing corrosion and consequent discoloration of the water. Exemption from internal protection is given in respect of installations filled with water, but from which water is not drawn, such as fire protection or heating installations.

Byelaw 11—Pipes of Wrought Iron and Steel

With regard to Clause 6 of this byelaw, galvanising of wrought iron or steel is not an effective protection of the iron or steel against corrosion when in contact with the water in supply; therefore the use of these types of pipes is prohibited, unless forming part of a closed system from which water is not drawn. The Department have not given general approval to any method of protecting wrought iron or steel from internal or external corrosion, other than lining with concrete, but have permitted to be buried in the ground on a trial basis, subject to certain conditions, bituminous lined and wrapped steel pipe. Wrought iron or steel pipes in connection with closed circuits may be laid in properly designed underground ducts outside a building, and the Department have accepted bare pipes in ducts constructed to exclude the entry of any surface water by the incorporation of a watertight membrane, e.g., asphalte. In ducts which are not of watertight construction the piping must be protected.

Methods of Protection so far permitted are—

1. Ducts lined with Pluvex ruberoid with the laps heat-sealed.
2. Denso-therm tape wrapped spirally round the pipe with laps heat-sealed.
3. Ordinary denso tape wrapped spirally with adequate lapping around the heat insulating material.
4. Two layers of Pluvex ruberoid applied to the outside of the heat insulating material with the laps sealed with bitumen applied hot.

The provision of drains from underground ducts with the object of preventing the ducts becoming water-logged is not permitted owing to the possibility of water supplied by the Department running to waste without being detected.

Byelaw 12—Pipes of Copper

Copper pipes laid in the ground must be protected against external corrosion (Byelaw 17). To meet this requirement the Department accepts the use of ordinary denso tape wrapped spirally around the circumference of the pipe with adequate lapping. Plastic covered copper pipes to B.S.1386 have also been accepted for use in the ground.

Byelaw 13

The byelaw relates to the jointing of copper pipes by compression and capillary fittings.

The use of capillary fittings in connection with copper pipes laid in the ground is prohibited by the Department. Compression fittings for jointing fully annealed copper piping and any other copper piping conforming to B.S.1386, to be buried in the ground, must be of the manipulative type B. Due to the possibility of undue deterioration of the pipework and fittings, and the danger to any person using or repairing the pipe caused by the indiscriminate earthing of electrical installations to the water pipe, copper pipe should not be laid below ground as part of a service from an asbestos main or supply pipe.

Byelaw 14—Pipes of Materials not mentioned in the Byelaws

The restricted use of polythene tube conforming to British Standard 1972 : 1953 has been permitted by the Department subject to:—

1. Not being used to convey hot water.
2. Not being buried in the ground without the prior consent of the Department (its use is prohibited below ground if liable to contamination by coal gas).
3. Compliance with all the Department's byelaws where applicable and in particular with Byelaw 19.
4. Service pipes shall be heavy gauge not exceeding ¾ in. nominal bore. Distributing pipes, overflow, warning and flushing pipes may be of normal gauge not exceeding 2 in. nominal bore.
5. Joints shall be one of those as shall from time to time be approved by the Department.

BRITISH STANDARD 1972–1953
POLYTHENE TUBE FOR COLD WATER SERVICES
EXTRACTS FROM THE STANDARD

Heavy Gauge Tube

Nominal Bore	*Working Pressure*
½″	230 lbs. sq. in.
¾″	150 lbs. sq. in.

Byelaw 17

The depth of 2 ft. 6 in. has been found by experience to be the most suitable to afford protection against damage by frost. This amount of cover should be maintained at the point where the service pipe enters the building. In arable land it is recommended that the amount of cover should be increased to 3 ft. The laying of pipes below ground by mole ploughing methods is not permitted unless the pipe is to be used for a temporary purpose.

Byelaw 19, Clause 1

So far as is reasonably practicable every water fitting inside a building shall be so placed as not to render it liable to damage by frost. To be effective without draining down, this pre-supposes continuous maintenance of an adequate temperature inside a building.

Clause 2. Where a water fitting, whether inside or outside a building, is so placed as to render liable to damage by frost it shall (unless it is a warning pipe or other overflow pipe) be reasonably protected from such damage. Most protective measures are not a complete safeguard during prolonged frost and merely delay freezing.

Clause 3. The requirements of this byelaw shall in relation to houses be deemed to be specified if the placing and protection of the fittings are in accordance with recommendations contained in the British Standard Code of Practice C.P.99 (1956) " Frost Precautions for the Water and Sanitation Services in Buildings."

Damage by frost is most likely to occur in the following places:—

(*a*) above ground and not in a building

(*b*) in an unheated building, cellar, outhouse or other structure

(*c*) in a ventilated space under a floor

(*d*) in a roof space

(*e*) near an airbrick or other ventilator

Pipes and fittings which have to be located in such places must be protected by lagging with thermal insulating material under the requirements of Byelaw 19, Clause 2.

Byelaw 20—Accessibility of Water Fittings

As an interim measure pending confirmation of the Department's existing byelaws, the Department conditionally permitted in buildings the enclosing of pipes forming part of closed circuits from which water is not drawn, in ducts with loose continuous slabs immediately below the floor screed. This form of construction is not now permitted except in the case of crawling ducts of sufficient cross-sectional area as will permit of examination, repair or replacement of the enclosed fittings. As with external ducts, the provision of drains from a duct with the object of draining a duct is not permitted. Ducts should be constructed to fall and be so arranged that the discharge of water from leaks may be readily seen.

Clause (11). As far as may be necessary for the due operation of any system of heat radiation, that is, panel warming, pipes may be embedded in the fabric of a building. In order to comply with Byelaw 3, Clause (*a*) Prevention of Waste, etc., pipes must be so arranged that any leakage therefrom will be readily detected. Leakage from piping enclosed in a floor superimposed on the soil may continue undetected indefinitely unless adequate measures are adopted to obviate this possibility. It has been decided therefore that in all such ground floor warming systems in which the public supply is used there shall be interposed between the base concrete and the heat insulating medium an efficient watertight membrane, so arranged as to divert any leakage of water to a position where it will be readily detected.

Byelaws 21, 22 and 23

These byelaws relate to the provision of stop valves which, coupled with the requirements of Byelaw 23A for provision of drainage taps in suitable positions for the complete draining down of all installations, is regarded as being the most positive safeguard against damage and waste of water.

Byelaw 24, Clause 2

This specifies that " every draw-off tap and stop valve, not being of the ordinary screw down pattern, shall be capable of resisting a pressure of at least 300 lbs. per square inch, and every valve, spindle and other internal part and, where the nominal size of the tap or valve does not exceed 2 in., the body thereof, shall be made of a corrosion-resisting alloy. Provided that the requirements herein contained with regard to pressure shall not apply to a control valve on a closed circuit from which water is not drawn."

Types of fittings for which no British Standards exist and which are accepted by the Department since they are regarded as fittings which do not offend against the requirements of the byelaw are:— Supa taps, some forms of cam action taps, and spring loaded non-concussive self-closing taps, and in hospitals and surgeries only, wrist action taps subject to their being supplied from storage. Drainage taps provided with removable keys may conform either to British Standard 1010 : 1953 or to B.S.2879 : 1957. Ordinary plug type cocks are not accepted, but self-lubricating gland plug cocks of certain patterns are permitted in connection with hot water heating installations for isolating and draining down purposes.

Byelaw 29 (1)

"No service pipe or distributing pipe or cistern used for the reception or conveyance of water supplied by the undertakers shall be used or so connected that it can be used for the reception or conveyance of any water other than that supplied by the undertakers:

"Provided that where the water supplied from the undertakers' mains to any cistern is discharged into the air not less than six inches above the top edge thereof this byelaw shall not apply to such cistern or to any distributing pipe leading therefrom."

The effect of this byelaw in conjunction with Byelaws 30, 40, 41, 44 and 51 is to prohibit the direct connection to a service pipe of any fitting, receptacle or pipe in such a manner as to be likely to cause or permit contamination of the water in the service pipe or mains. It is not permissible to connect direct to a service pipe certain types of apparatus such as refrigerators, milk coolers, welding machines, certain types of sterilising equipment, types of drinking fountain in which the inlet jet can become submerged, or automatic fire sprinkling installations in which are incorporated gravity tanks.

Byelaw 31

This byelaw prohibits a cross connection between a service and distributing pipe so frequently found where storage facilities are provided. The Department do not normally permit any type of pump to be directly connected to a service pipe but, subject to approval of details, a booster pump for charging or maintaining the pressure in a pressure tank may be installed on a branch from the service pipe supplying an automatic fire sprinkler installation, provided the rated output of the pump does not exceed 40 gallons per minute.

Byelaw 33

Galvanised mild steel cisterns of a capacity not exceeding 1,000 gallons must comply with British Standard 417 : 1951 Grade A. Experience has proved that galvanised storage cisterns for cold water have a relatively long life, but it is recommended that they should be further protected against internal corrosion by the application of two coats of bituminous enamel or other suitable non-toxic paint.

Byelaws 45 and 47

Pipes for conveying hot water, unless forming part of a closed circuit, must be of lead, copper or corrosion resisting alloy. The use of galvanised iron or steel cylinders or tanks is prohibited due to their inability to resist the corrosive action of the water which is intensified when the water is heated. Under the provision of Byelaw 3 the use of ferrous metal boilers for direct hot water supply systems is restricted unless effectively protected internally. Bower Barffing is not regarded as an efficient means of protection against corrosion. Apart from all copper boilers and the indirect system, the following alternatives have been accepted on a provisional basis:—

1. Ferrous metal boilers vitreous enamelled or glass lined internally
2. Copper clad steel
3. Stainless steel clad steel
4. Stainless steel
5. 30% Chrome steel.

Byelaw 46

This particular byelaw is directly related to the prevention of waste. The quantity of dead water held in the hot water pipes is as follows:—

¾ in.	diameter	40 feet long	=	0·77 gallons
1 in.	,,	25 ,, ,,	=	0·85 ,,
1¼ in.	,,	10 ,, ,,	=	0·53 ,,

The amount of water run to waste due to badly designed and inefficient hot water supply systems can be considerable and too much emphasis cannot be placed on the need to reduce even the maximum specified lengths of dead legs permitted under this byelaw, by the introduction of secondary flow and return systems. Where any mixing valve or blender is installed the distance between the hot water storage vessel or secondary circulation and the mixing valve or blender shall be added to the distance between the mixing valve or blender and the draw-off tap.

Byelaw 60

The Department operates a scheme whereby, by agreement, plumbers have been authorised to fix or alter water fittings without giving prior notice. They are, however, required to give notice of those alterations after they have been made.

Exemption from Byelaws

There are four principal exemptions from compliance with the specific requirements of the byelaws. *The first exemption* specified in Byelaw 4 applies to existing fittings lawfully installed before the new byelaws came into force. Exemption cannot be claimed in respect of fittings should the fittings be so defective as to contravene any of the provisions of Byelaw 3, i.e. waste, undue consumption, erroneous measurement or contamination of water or reverberation in pipes. *The second is detailed in Byelaw* 5. Whilst this byelaw permits exemption from the general requirements of the byelaws in cases of an unusual nature such as in research work and industrial processes where compliance is impracticable and the supply to the premises is by measure, exemption does not extend to the use of any fittings that is likely to lead to waste, undue consumption,

erroneous measurement, etc., referred to in Byelaw 3 or to the requirements of Byelaw 31.

The third exemption from all of the byelaws is granted to railway premises in Section 17(4) of the Water Act 1945 which is as follows:—

> " Nothing in this section or in any byelaws made thereunder shall apply to any fitting used on the premises which belong to a railway company and are held or used both for the purpose of their railway, so long as those fittings are not of such a nature or so arranged or connected as to cause or permit waste, undue consumption, misuse, erroneous measurement or contamination of water supplied by the undertakers or reverberation in pipes, provided that the exemption conferred by this sub section shall not extend to any fittings used in hotels or dwelling houses or in offices not forming part of a railway station."

The qualification so long as these fittings are not of such nature or so arranged or connected as to cause or permit waste, etc., does in effect mean that no matter how inferior a fitting may be in relation to byelaw requirements, no action can be taken by the water undertakers so long as these fittings do not cause waste, undue consumption, etc.

Lastly, the byelaws obviously cannot operate in respect of fittings conveying water other than that supplied by the undertaking.

Testing of Fittings

Power to test fittings is contained in the Third Schedule of the Water Act 1945, Clause 61, viz. the undertakers may test any fittings used in connection with water supplied by them.

The City of Birmingham Water Department require all fittings of the following nature to be submitted for testing and stamping: Taps, stop valves, ball valves, cylinders, storage and flushing cisterns. Amongst fittings which need not be submitted for testing and stamping are ball valves of the Portsmouth pattern conforming to British Standard 1212 and bearing the J.C.S.W.R./KITE licence mark. Isolating valves for use in connection with heating systems, i.e. closed systems from which water is not drawn, are also exempt from testing. The Department will at the option of the applicant test in situ cisterns and cylinders or calorifiers of a capacity of 500 and 250 gallons or more respectively, subject to the applicant agreeing to pay the requisite fee and providing the necessary testing facilities.

The view has often been expressed by certain people that the byelaws go too far; others that they do not go far enough. To a large extent opinions expressed are influenced by the side of the fence on which a person might be.

The occupier who finds his house and furniture ruined by water, whether caused by a defective fitting or frost, cannot understand why byelaws are not more exacting!

As far as current byelaws are concerned they are limited as to their operation to control of waste, undue consumption, misuse, etc. Consequently, control of the design of installations is somewhat limited. Whereas building byelaws lay down requirements to the effect that full details, such as plans of proposed buildings, adequate description of materials, etc., must be submitted for approval by local authorities, waterworks legislation does not provide for such a requirement. Far too frequently the extent of proposals is not known until they are actually put into effect.

The water fittings in a building for example may meet every byelaw requirement—no waste, no undue consumption, no contamination, but could still quite easily fail to satisfy the consumer, although from the legal angle the water undertakings are satisfied.

Administration and enforcement of byelaws with its many problems and complexities is far from easy, but for the record I would say that my duties as an Inspector with the City of Birmingham Water Department have brought me in contact with many Hospital Engineers, and I am happy to say that my work has usually been made much easier by their understanding and ready co-operation.

ELECTRICAL EQUIPMENT FOR NEW SCOTTISH STEEL PLANT

A comprehensive contract for all the electrical equipment in three steel rolling mills has been awarded to English Electric by Colvilles Ltd. for their new Ravenscraig plant, near Motherwell, the biggest industrial project ever undertaken in Scotland.

All the equipment will be engineered by English Electric's Metal Industries Division and mainly manufactured at the Company's Stafford works. Manufacturing will also be done at Bradford, Liverpool and Kidsgrove. Delivery will be completed by the end of 1961.

TRAVELLING EXHIBITION

Negretti & Zambra, the scientific instrument manufacturers who have been making thermometers and precision instruments for over a hundred years, recently staged an exhibition of instruments for temperature measurement and control at Cardiff, Birmingham, Manchester, Glasgow, Newcastle, Sheffield and Nottingham.

The exhibition consisted of 12 exhibition units on which were displayed many types of temperature measuring instruments and temperature controllers.

A re-styled transmitter together with " On-Line " and " On-Plant " controllers and a new " Aetec " range of thermo-electric temperature indicators and controllers were shown for the first time and the exhibition literature is available on application.

The exhibits were transported in a mobile demonstration unit which was hauled by a Landrover over a distance of nearly 1,000 miles. A total of 3,294 visitors came to see the exhibition over a period of seven weeks.

The show included a section dealing with the development of the glass thermometer from 150 B.C. to the present day.

Air Filtration — Why and How

By G. H. VOKES

PART III

Parts I and II of this paper were published in our January and February issues. In this, the concluding part, the Author describes methods of test for ultra-fine particle size and touches on inertia cleaners and flocculators.

HAVING now repeatedly referred to the Methylene Blue test, I think I should belatedly say a few words on this.

When dealing with extremely fine particles under, say, one micron, it is quite impracticable to test a filter gravimetrically, as not only would such fine dusts be extremely difficult to produce and store, but a degree of agglomeration would occur before the dust was fed to the filter.

To overcome these difficulties, tests have been evolved in which the dust is actually produced at the time of the test. The aim is to produce a predominance of particles between 0·1 and one micron, so that the majority fall within the critical range for filtration mentioned earlier. It follows that the efficiency of a filter tested with the most critical dust can be considered the absolute efficiency, as it is the lowest that is likely to be obtained by adjusting particle size. It is logical to refer to filters which show up well under such tests as " absolute filters."

This seems the most sensible interpretation of the term, which probably started life as an " Americanism." No doubt many have been unwittingly led to believe that an absolute filter filters " absolutely "—i.e. removes everything. This is not true, for efficient as some types are, there is always a measurable penetration. This can be made as small as we wish, if finances permit; in general, a penetration of one part in 100,000 based on either the Methylene Blue or D.O.P. method is accepted for the most stringent nuclear or bacteriological requirements.

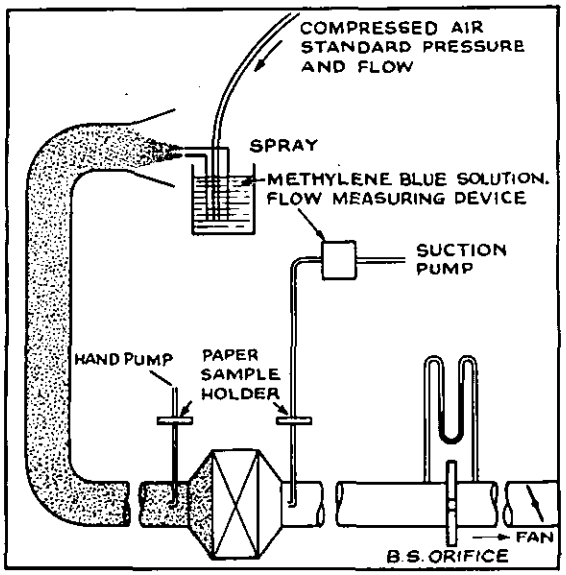


Fig. 14. Methylene Blue Test.

The D.O.P. (di-octyl phthalate) test is the accepted method in the U.S.A., and is based upon the penetrating properties of D.O.P. smoke. When produced in the apparatus, this has a remarkably uniform particle size in the 0·2 to 0·4 micron range, and this is well within the limits required for " absolute " efficiency testing. The black D.O.P. smoke-laden air is firstly passed through a light-dispersion or transmission tube incorporating a light source of standard brilliance, and a photo-electric cell located a standardised distance away. The smoky air then passes to the filter under test before entering another similar photo-electric senser. The electric outputs from the two photo-electric cells are amplified and fed to calibrated bridge circuits which cause a galvanometer to register direct the performance of the filter.

This method is obviously rapid and well suited to mass production techniques. Unfortunately, the apparatus is extremely costly, and where hundreds rather than thousands of filters are concerned, the expense cannot be justified. The Methylene Blue test was evolved in the United Kingdom, and is considerably simpler both in conception and application. It is based on the tendency for an atomising spray unit of standardised design and fed with compressed air at constant pressure, to produce spray droplets within a given size range. The test is fully described in British Standards Specification BS.2831, and is illustrated diagrammatically in Fig. 14. Fig. 15 shows one actual layout in regular use. The standard atomiser nozzles are fed with compressed air at 30 lb./sq. in., and with a solution of methylene blue dye in distilled water at a concentration of one per cent by weight.

The spray covers a wider range of particle sizes than the D.O.P. smoke, and is normally assumed to lie between the limits of 0·01 and 1·3 microns. Although this might suggest the test as less sensitive

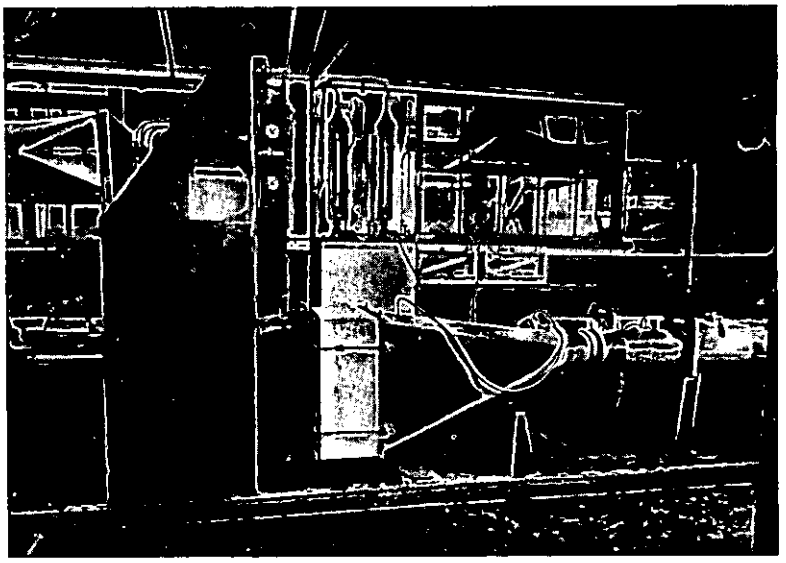


Fig. 15. A Methylene Blue Test Rig.

than the D.O.P., checks upon filters previously tested in the U.S.A. have generally revealed little difference in indicated penetration; if anything the Methylene Blue method has proved the more searching.

The test rig is arranged so that the spray enters a sufficiently long duct to allow all moisture to evaporate from the droplets before the residual dust reaches the filter. Test points are provided immediately upstream and downstream of the filter, and the accepted technique is to compare the staining properties of the unfiltered and filtered air by abstracting suitable sample volumes through discs of white filter paper. For example, if 10,000 cc. of filtered air produces a matching intensity of stain to 10 cc. of unfiltered air, the filter is deemed to have a penetration coefficient of one part in 1,000, or 0·1%. This test takes longer than the D.O.P., but in its absence of automatic features it is more convincing, and of course, is virtually foolproof.

The optimum flow rating at which filters should be used is normally set by the filter manufacturer, and takes account of factors such as separating efficiency, back pressure, acceptable dimensions and price. From the basic theory of filtration it might be expected that virtually any device other than a strainer would possess a correlation between flow rate and efficiency. For "commercial" standard filters—dry or viscous—the important modus operandi is impingement. It might reasonably be expected that the effect would be intensified with increase in flow rate, and hence velocity. This is so, and some filters, depending upon a number of factors such as Reynolds Number in the inter-fibre or inter-impingement surface passages, do possess, within a certain range, a direct flow/efficiency relationship.

Generally, however, the effect is only marked at very low flow rates, well below normal operating conditions, and if velocity is unduly increased, a reversal can occur, due largely to a scouring effect causing re-entrainment of particles already captured.

In practice, it is found that nearly all filters have a substantially flat flow/efficiency characteristic within a factor of (say) two upwards and five downwards from the nominal rating. The inference, of course, is that the conflicting factors of better impingement and re-entrainment or "bounce" approximately cancel one another. Absolute filters handling extremely fine dust subject to Brownian movement, can behave rather differently, and almost always benefit from reduced rating.

As a general rule, de-rating can almost always be recommended, on the grounds of economy in utilisation. The above reasoning has been confined to efficiency considerations without reference to dust handling capacity. A filter which is de-rated to half its normal flow rating not only has twice the area on which to accommodate dust—*it starts off at half the initial back pressure* as well. The overall utility of the filter is thus increased by up to *four* times. Needless to say, numerous practical factors intrude, but all other things being equal, space being available, and the necessary initial capital outlay justifiable by future savings, it is nearly always profitable to de-rate. Obviously, the converse applies to up-rating.

Cyclones, etc.

The so-called inertia cleaner and its most usual interpretation as a cyclone, is of very great value to industry, but its use is generally confined to separation of large quantities of manufactured dust rather than to atmospheric purification. It is of

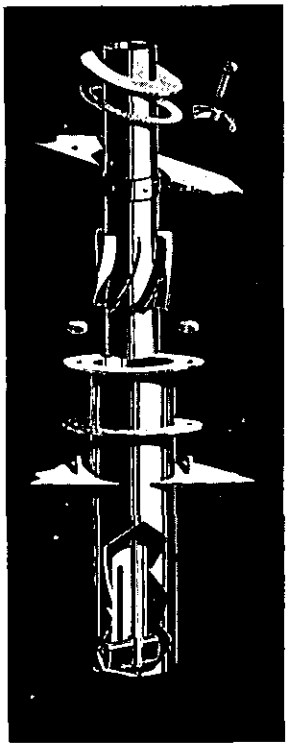


Fig. 16. Small Contra-Flow Cyclone.

interest, however, that more efficient small multiple cyclones are now being manufactured and are capable of separating efficiencies rivalling good commercial dry and viscous filters. As an indication, one small contra flow cyclone 3 in. diameter (Fig. 16) and handling 60 c.f.m. has shown itself capable of removing nearly 90% of a contaminant, all of which is below 10 microns in size. The theoretical cut is rather below 4 microns and the pressure loss under 5 in. w.g. Many such cyclones have the useful characteristic of a substantially flat efficiency curve over a ratio of as much as 10 : 1 on gas flow. In this case, flow from 10 up to 100 c.f.m. can be handled successfully. At the low end, for a slight reduction in efficiency, the P.D. is below 0·5 in. w.g.

Other Separators

We should say a few words about two other separators—the adsorptive type and the sonic flocculator.

Most substances have a capacity to retain fine particles or molecules upon their surface by a process of molecular attraction, but as the surface area, even in the finest conventional filters, is quite small, a molecular-thickness film over all the fibre surfaces involves only a minute quantity of material. Some materials, however, can be " activated " to possess a high degree of micro-porosity, so that their total effective surface area internally is so great that the quantity of material which can be adsorbed, even in molecular thickness, is large. Activated carbon is perhaps the best known, but other substances, such as synthetic zeolites, " silica gel " and alumina can also be made to possess the property. They are, therefore, useful for purposes such as solvent recovery from waste process gases and for odour removal, bearing in mind that most solvents and odiferous gases have higher molecular weights than the oxygen and nitrogen molecules making up the air. Adsorptives are also extremely useful as dryers.

Finally, a word on the sonic flocculator. It had been noted by some observers that a strong standing-wave sound field had the effect of causing suspended particles in a gas to flocculate. In effect, we are extending artificially the Brownian motion experienced by extremely small particles but in a much more regular manner. This is a disadvantage, since the particles we wish to contact one another will be moving more or less in unison. It is found, however, that particles of different mass respond unequally to the stimulus of the sound field, the larger ones tending to lag rather than follow the full cycle of the air pulse. It follows that differential movement will occur between the lighter and heavier constituent and repeated frictional contact will cause flocculation to occur. If the gas is now passed to a cyclone, not necessarily one of the super-high efficiency varieties, the relatively large flocculated solids will be effectively removed, including fines, which would otherwise pass with ease through the cyclone.

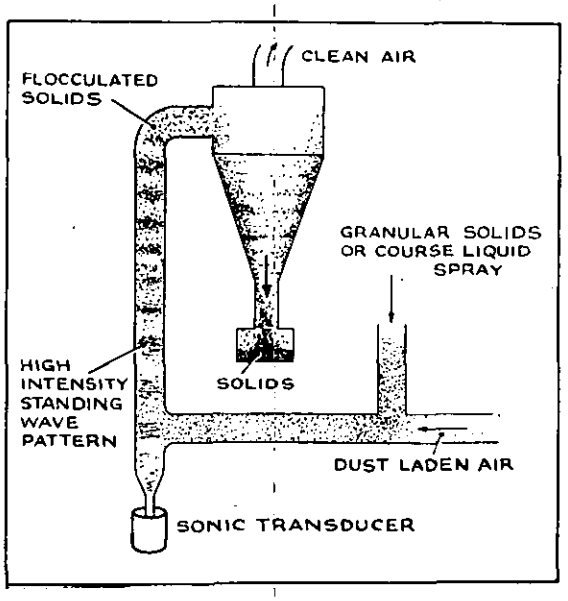


Fig. 17. Sonic Flocculator.

The principle has been used on a small industrial scale in the United States, and experimental work effected in this country; no great enthusiasm exists at present, however, in view of the at least equal effectiveness of alternative systems which have been more intensively developed and require less power for their operation.

Comments

So far I have delivered this paper in more or less its original form, but I am very aware of the fact that certain aspects, in which my present audience is interested, have not been covered. Perhaps I should touch on these briefly in order to preserve some continuity with your own interests.

One aspect of very great importance these days is the filtration of air supplied to hospital operating theatres. This subject has been discussed at some length by various authors, and I should mention two in particular. Dr. R. Blowers recently delivered a most interesting paper entitled " Discussion on the Ventilation of Operating Theatres " and this was published in the Journal of the Institution of Heating and Ventilation Engineers, 26, p. 257. Another interesting paper was that by Mr. J. P. Sandison, which also appeared in the Journal of the Institution of Heating and Ventilation Engineers, 26, p. 209. Mr. Sandison's paper was entitled " Air Conditioning in Hospitals and some related aspects of Lighting."

I am only too aware that numerous other studies on the same subject have been made, but I am afraid it is impossible to comment on them all at this meeting. For that matter I cannot say that I have been in complete agreement with every statement made in the above two papers and in fact I added a few remarks of my own which appeared in the written proceedings. However, one fact I think must be agreed by all who have given any thought to the subject. It is essential to obtain maximum freedom from bacteria in theatre air and this can only be achieved by controlled supplies of clean or sterilised air to the theatre, under pressure. The old system of ventilating theatres by means of extraction fans is, to my mind, nothing short of criminal, as this is an open invitation to bacteria laden air to enter haphazardly through all openings, of which the main entrance from the corridors and wards of the hospital is undoubtedly the easiest. It seems quite incredible that this procedure should have been adopted for so long.

If we accept that the theatre should be maintained under a slight positive pressure or plenum, it means that air *must* be supplied positively and in a controlled manner and it would seem that the best method of doing this is to cause it to enter from near the ceiling and to provide the outlet openings near the floor. The degree of cleanliness demanded of the plenum air does not seem to have been completely resolved. One theory is that although bacteria themselves tend to resemble spheres of approximately one micron diameter, most are associated with dust particles which may be very much larger.

Dr. Blowers has shown that removal of a large proportion of these dust particles by a commerical grade filter, such as the Kompak, can effect a remarkable improvement in bacteria count. Just how far we are justified in accepting this conclusion, I do not really know. I would have thought that use of an absolute or semi-absolute filter, as a second stage to the Kompak, would not only ensure virtually complete removal of dust borne bacteria, but would remove any unattached organisms as well. This would seem to be of importance if it was felt desirable to recirculate the air. Recirculation through highly efficient filters has become accepted as a highly satisfactory alternative to induction of " fresh " air, as quite frequently there is little to choose in the cleanliness of the two sources. In climates where extremes of temperature and humidity are involved, the cost of conditioning air from outside the building may be considerable, as well as presenting technical difficulties.

I am only too aware that some of my remarks on this subject are completely out of context with the intention of my paper and I should make it perfectly clear, if this is not already obvious, that my concern is with filtration. I say this as it will relieve me from the duty of discussing other methods of securing sterility, such as ultra-violet irradiation. No doubt you will be aware that this subject is very controversial, hence my pleasure at being able to dodge it!

Another recent development of interest to hospital engineers is the vacuum breaking filter, designed to prevent entry of bacteria into sterilising autoclaves and I have brought one of these devices with me for your examination. The filter medium for this filter consists of a sandwich of fine glass fibres and of glass absolute filter paper. The Methylene Blue penetration would be in the region of 0·001% and for all intents and purposes we can accept air which has passed this filter as being sterile. I might add that the filter incorporates an orifice to prevent an excessive surge of air through the filter when the vacuum breaking valve is first opened.

Other specific applications of filters in hospital and pharmaceutical work are covered by many of the types described earlier in this paper. It is safe to say that the high efficiency absolute filters will find increased use for these purposes as the advantages they can offer become more widely appreciated. I realise in this connection that some authorities are in favour of different types of separating equipment, such as electrostatic precipitators or electrostatically assisted filters. As with all

things, there is generally some degree of controversy, not assisted by the fact that most people are biased somewhere along the line. I suppose I should be fair and include myself with these and in case any suggestions may be made to this effect I should add in self defence that authorities, whose concern is the cleaning of air in the most stringent applications in the atomic energy and bacteriological fields, almost unanimously agree that the high efficiency positive action filter is the safest answer.

Conclusions

This has been a paper on "filtration." Just what constitutes a "filter" I have not tried seriously to define. In its narrowest sense, an air filter is a device which removes solids (or liquids) from air by the basic mechanical processes of straining, impingement and diffusion. There is a tendency, however, to refer to "electrostatic filters," meaning "electrostatic precipitators," and to "centrifugal filters," meaning "cyclones." I have, therefore, tried to be liberal in my interpretation of the term, and include these devices as well within the scope of my remarks.

However, with the best will in the world it is not possible to cover every device adequately in one short paper. I am, therefore, painfully conscious of numerous important omissions; in particular, reference has been omitted to at least one whole family of devices, including water washers, scrubbers, and disintegrator scrubbers. Some of these devices have a prime application to the field of dust, mist or fume collection, and so are outside our immediate terms of reference. It is hoped, however, that what has been said will be of value as a general guide to the subject of air cleaning, and indicate the principles on which the filter specialist tries to interpret requirements, and recommend the best unit for a given application.

Abstract of Reports

Greenwich and Deptford H.M.C.

The subject matter contained in the Greenwich and Deptford H.M.C. Annual Report, dated the year ending 31st March, 1959, did in fact cover a period of some fifteen months owing to the date on which the Report was presented, this having been put back until the autumn.

In this, the Committee's tenth report, it was appropriate to refer to the first decade of the Service. The achievements of the Service had been substantial, although much remained to be done. This situation was reflected at Greenwich and Deptford.

Plans for a new Out-Patient Department were known to be in the hands of the Ministry, and £100,000 had been included in the Capital Works programme for 1960/61, and later years, towards the cost of this work in connection with the replanning of St. Alfege's Hospital. This was together with £10,000 for the first phase of development.

The Committee considered that the urgent work of new sanitary annexes in Blocks 1 and 2 should go forward at the same time and had conveyed this view to the Regional Board.

One major step so far achieved had been the provision of improved catering facilities for patients and staff.

While the numbers of beds at the Miller General Hospital and St. Alfege's Hospital II remained unchanged at 180 and 269 respectively, the number at St. Alfege's I has now been consolidated at 336, involving a reduction of 31.

Mr. G. Simm, Superintendent Engineer to the Group, retired on April 30th, 1959, after almost forty years in the Hospital Service. He was appointed to St. Alfege's in 1927. Mr. Simm was succeeded by Mr. D. A. H. Black, previously Senior Engineer at St. Alfege's.

During 1958 a new major X-ray unit was installed at the Miller Hospital and this, together with the necessary redecoration, had resulted in a bright, up-to-date department.

In the Laundry at St. Alfege's a new four-roll calender complete with folding apparatus was installed, and an ironer converted from belt to electric drive. An improved electricity supply has made it possible to introduce various labour saving devices including floor polishers.

At the Miller Hospital £6,000 worth of heating improvements to the Children's Ward are now in train and the installation of a "Multitone" staff location system has been completed.

To assist in reducing the risk of cross-infection, every effort is being made to increase the frequency of wall cleaning and the usual redecoration work has been carried out.

Bradford "A" Group H.M.C.

In his Foreword to the Bradford "A" Group Report for 1958/59, the Chairman, Mr. H. Jaques, emphasises the very great encouragement given to the Committee and to himself by the news that the Ministry had awarded a grant of £500,000 for the development of the Bradford Hospitals, with special reference to the replacement of the Royal Eye and Ear Hospital. He hoped that this would soon be followed by the replacement of St. Luke's Hospital as it was quite unsuitable for present conditions.

During the year the following works at St. Luke's Hospital were completed :—

- The provision of a new Mortuary to replace the existing inadequate building ;
- The rehabilitation and refitting of "E" Block ;
- The provision of new waiting rooms, lavatories, etc., in the X-Ray Department ;
- The conversion of part of the Nurses' Home to provide accommodation for the Midwifery Staff ;

Instructional kitchen unit for patients in the Occupational Therapy Department ;

New Reception Office in the Out-Patient Department ;

and the following works were commenced and are nearing completion :—

Rehabilitation of " E " Block ;

Conversion of midwives' old home to resident medical officer's quarters ;

Improvements to heating and engineering works.

At the Royal Infirmary the following works were completed during the year :—

Alterations and extensions to Out-Patient and Casualty Department.

At the Bradford Children's Hospital the following works were completed during the year :—

Alterations and improvements to Wards A.1 and B.1, including plastering and painting of glazed brick walls ;

Installation of new kitchen and cooking equipment.

At Woodlands Hospital work has commenced on new kitchens and ancillary accommodation ; at Sir Titus Salt's Hospital new kitchen and cooking equipment has been installed ; at St. Catherine's Home new cooking equipment has been installed and at Waddilove's Hospital the hospital was closed in February for extensive alterations to the wards to enable a larger number of patients to be treated.

Preston Hall H.M.C.

The Report of the Preston Hall H.M.C. covers the period April 1st, 1957, to March 31st, 1959. During this period a considerable change had taken place with the admission of non-tuberculosis patients. The name of the hospital had been amended to Preston Hall Chest Hospital and much new equipment had been installed to assist in the treatment of this new class of patient.

The Regional Hospital Board have completed the installation of oil fired boilers since the last report. Central heating is now available to Preston Hall main building and all wards. The boiler house plant and central heating to date has cost £52,767, and the current year will see the completion of the second stage of the central heating.

All wards are now able to maintain an even temperature, and the hot water service is ideal. Considerable economies were possible in man-power, although no person was declared redundant, normal wastage providing the reduction.

Owing to the increase in the use of gas both for the laboratory and the kitchens it was necessary to improve the supply at the cost of £1,000. There is now a reserve capacity to cover any extension of the service that is likely to be required.

Woolwich Group H.M.C.

The Annual Report for 1958 of the Woolwich Group H.M.C. included a survey of the first ten years.

The Management Committee had been able to make real progress in 1958 with the scheme for the centralisation of laundries. The work will be concentrated in the Brook General and St. Nicholas Hospitals. The scheme, providing a through-put of 50,000 pieces per week, will enable all the work at present being undertaken by commercial firms to be handled in the two modernised laundries. By the end of the year sums of £14,000 and £10,000 will have been spent.

Since the last war, poliomyelitis has come to the fore as an infectious disease and in readiness for any outbreak, a special centre has been set up at the Brook General Hospital, equipped with an extensive range of mechanical and electrical equipment, a warm pool to facilitate hydrotherapy, and specialist medical staff.

More emphasis was being placed on the dangers of infection arising from dirty walls and it is estimated that the annual expenditure on painting and cleaning should be some £23,000, whereas a maximum of £16,000 was all that it had been possible to devote in a year.

Electricity consumption had been considerably influenced by the ever-increasing range of appliances, such as heated food trolleys, suction machines, X-ray apparatus, etc., and particularly by the installation of lifts at Brook General Hospital.

In 1955 the boilers at St. Nicholas Hospital were converted from coke to oil burning, likewise in 1957 those at Brook General. This had resulted in a financial saving of £2,000 and £4,500 per year respectively. The boiler plant at the Memorial Hospital had been adapted in 1956 to burn coal instead of coke and, with the installation of mechanical stoking equipment, had resulted in a saving of over £2,000 per annum.

There was an enormous backlog of work and this was made worse by a depleted engineering staff.

Retirements from the staff during 1958 included Mr. T. J. Griffiths, senior engineer at Brook General Hospital.

York "A" & Tadcaster H.M.C.

The 10th report of the York "A" and Tadcaster H.M.C. covers the period for one year ended 31st March, 1959. During the course of the year the St. Maurice's Rectory grounds adjacent to the County Hospital were acquired by the Committee and would provide a valuable addition to the limited space available at the hospital. Revised plans were being drawn up for the building of a new Physiotherapy and Rehabilitation Department and the later extension of the Casualty and Orthopaedic departments.

The new Boiler House at the County Hospital had been completed and was functioning satisfactorily.

New bed head lights had been provided on all wards at the City Hospital and many other works of improvement carried out. The new staff recreation hall had been completed at this hospital and was in use.

Structural alterations at Bootham Park included a complete rebuilding of the main kitchen and its associated offices. Other alterations included the nurses' changing rooms.

On the engineering side at Naburn, automatic stokers have been installed in the boilers and instrumentation has been completed to provide maximum fuel efficiency. The installation of the electric ring mains is almost complete. It will now be possible to transfer the hospital from direct current to alternating current. This is a matter of some moment as it affects many machines essential both to clinical and domestic use.

Correspondence

26th February, 1960.

The Editor.

DEAR SIR,

In the December 1959 issue of the HOSPITAL ENGINEER a letter was published from me in which the final paragraph was:

"I understand that a proposal has been put forward at the Association of Hospital Management Committees that the qualifications required for Engineers should be lowered so that the vacant posts can be filled by unqualified craftsmen."

I have since had some correspondence with the Association of Hospital Management Committees and I have looked into this matter and I find that I was either misinformed or misunderstood, and the actual proposal was for the recruitment of personnel for the position of hospital engineers through apprenticeship.

In fairness to the Association, I would be glad if you would publish this letter.

Yours faithfully,

W. A. GALT,

Superintendent Engineer.

Chelmsford Group Hospital Management Committee,
London Road,
Chelmsford, Essex.

2nd March, 1960.

The Editor.

DEAR SIR,

As might have been expected, I have been particularly interested in recent correspondence in the JOURNAL and in your editorial comments in the February issue.

I am very conscious of the intense disappointment felt throughout the entire membership regarding the totally unsatisfactory outcome of the prolonged negotiations for realistic salary awards. I share this disappointment completely, especially in the light of recent awards to other categories of staff which make the Hospital Engineer more than ever the "cinderella" of the Service.

Some of the criticism voiced has been directed at our own negotiators, and it is said that our claims were not bold enough. Our representatives have done their best and, in fairness to them, the following points should be borne in mind:

1. When the claim which has resulted in the recent arbitration award was made in 1958 it bore a reasonable relationship to the salaries then being paid to other grades.
2. None of us then knew or could possibly have foreseen what the effect would be of the Noel Hall Report, the Royal Commission on Doctors' and Dentists' pay, and other similar activities.
3. It should be remembered that the Staff side of Committee "D" is composed of seven other organisations besides ourselves and it is necessary, under the existing set-up, for any claim submitted to be agreed by all these bodies before it can be put forward.

I agree with your statement that Whitleyism does not now work satisfactorily. This is quite clear and we therefore have to find some suitable alternative. Members will like to know that active steps are being taken to this end.

Yours faithfully,

H. A. ADAMS,

Chairman, I.H.E.

Blackberry Hill,
Fishponds,
Bristol.

4th March, 1960.

The Editor.

DEAR SIR,

I have read with interest recent letters in the JOURNAL, dealing with the problem facing hospital engineers at the present time. Your editorial in the current issue of the JOURNAL stresses the fact that the latest salary award has shaken us to the very roots. It is true we are shaken, not only by the inadequacy of the award in comparison with other awards, but by the inadequacy of the claim put forward on our behalf. Agreed Whitleyism is a failure, yet the arbitration court made a very fair award considering the amount of the claim. The inadequacy of the claim is the fault of our own side of the negotiation and until we are represented by a more ambitious and courageous attitude on the staff side I, for one, have little hope for the future.

We are concerned that, at a time when the Government, as an election pledge, has promised more money for hospital building and improvement, there will be Engineering officers of the right calibre to see such expenditure properly applied in its practical aspect.

There is no training scheme within the Service and we view with great concern the failure to attract qualified engineers of the right type. Graduate engineers are not attracted to the Assistant Engineering grades due to the very low salary offered, and it takes several years to train a Hospital Engineer in all phases of his work so that he can cope with the engineering complexities of the modern hospital.

Does not the Minister realise that such men need a specialised knowledge, only acquired by a technical education and by actual hospital experience in practice? In this modern age, in a very few years, our hospitals should be equipped with engineering plant and equipment of complex and advanced design and in keeping with the advances that are being made in science and engineering.

We wonder if indeed hospitals will be so provided, in view of the fact that, already, Regional Boards are failing to attract qualified men and the same thing is happening at Group level. Is the Minister so unenterprising that he is not looking to the future? It would seem that his advisors are as short sighted as our own representatives if the recent claim is any criterion of what they consider to be our value.

It is obvious that there is fault on both sides but mainly, I think, on the side of the Ministry. It is their duty to plan the years ahead, to see our hospitals are brought up to date in plant and buildings and to see that they are manned by people of the right calibre, experience and qualifications. On the administrative side they have made such provision, on the technical side nothing has been done. These points of view have already in various forms been expressed in the National Press.

It is the duty of every engineer in the Health Service at this time to play his part in bringing to the notice of responsible people the need for a full investigation into the duties and conditions of Hospital Engineers, with a view to assessing their worth in comparison with the high degree of responsibility they are expected to accept.

Yours faithfully,

H. F. H. DOLLING,
A.M.I.Mech.E., M.I.Mar.E.
Superintendent Engineer.

Glantawe Hospital Management Committee,
St. Helen's Road,
Swansea.

DEATH OF CAPT. G. T. SMITH-CLARKE

Extensive work on Breathing Machines

The death occurred on February 28th of Captain G. T. Smith-Clarke. He had been in failing health for some while.

The following notice appeared in *The Times* of February 29th:—

Captain George Thomas Smith-Clarke, formerly chief engineer and managing director of Alvis Ltd., died at his home in Coventry yesterday at the age of 75. He was perhaps best known in the last 10 years for his work on the improvement and development of mechanical respirators used in the treatment of poliomyelitis.

He was born at Bewdley, Worcestershire, and was chief engineer of Alvis from 1921 to 1950. He was a member of the Institute of Mechanical Engineers, a Fellow of the Royal Aeronautical Society, and a Fellow of the Royal Astronomical Society. At the time of his death he was a group chairman in the Birmingham Regional Hospital Board and it was in this direction that his work lay after his retirement from Alvis. He was responsible for modification and improvement of the Nuffield Both respirators which were in use when poliomyelitis became more prevalent in the late 1940s. He then developed his own cabinet respirator, a junior respirator, a rocking bed, and various other types of respirator used in the treatment of the disease. He also designed and made in his own workshop an angiocardiography machine.

BONDING OF RIGIDEX POLYETHYLENE

Information on the bonding of Rigidex high density polyethylene is given in Technical Information Sheet No. 9, just issued by British Resin Products Ltd., Devonshire House, Piccadilly, London, W.1.

Procedures for hot gas welding and butt welding are described in the new information sheet, together with data on the use of pressure sensitive adhesives and polar and hot melt adhesives.

Copies are available from the company on request.

A.E.I. (WOOLWICH) LTD.

As already announced, on January 1st, 1960, Siemens Edison Swan Ltd. changed its name to Associated Electrical Industries (Woolwich) Ltd. The new Company is responsible for managing four new Product Divisions of A.E.I. Ltd.

These are:—A.E.I. Telecommunications Division, A.E.I. Radio and Electronic Components Division, A.E.I. Cable Division, A.E.I. Construction (Cables & Lines) Division.

In addition, the following companies are now grouped under the management of Associated Electrical Industries (Woolwich) Ltd:—

The London Electric Wire Co. and Smiths Ltd.

A.E.I. Plastics (Aldridge) Ltd. (formerly Aldridge Plastics Ltd.).

Henley Foundries Ltd.

The Fixed Price Light Co. Ltd.

VOKES ACHIEVEMENT

The Autoroll, an automatic air filter, was introduced by Vokes Ltd., eighteen months ago. To date, orders have been received totalling 3,500,000 c.f.m.; a remarkable achievement for an entirely new type of filter.

Units are operating in a great variety of installations and places throughout Britain and many enquiries are being received from overseas.

B.S.I. News

Abstracts from information supplied by the British Standards Institution

NEW BRITISH STANDARDS

B.S. 1947: Impregnated-asbestos-covered copper conductors. 1947: Part 3: 1960 Round wire: Metric units. 4/6

Gives requirements and dimensions, in metric units, for impregnated-asbestos-covered round copper wire for electrical machinery and apparatus. The electrical and mechanical properties of the conductor and the method of determining the increase in diameter due to the covering are specified. A table of standard metric sizes from 0·25 mm. to 5 mm. diameter (bare) is given, with dimensional requirements and resistances. Tests are included for bending, heat-ageing, electric strength, loss on ignition and elongation of the covered wire.

B.S. 3193: 1960 Toughened glass doors and panels for domestic appliances and similar uses. 3/–

Specifies requirements for quality and transparency, composition, toughening, fragmentation and thermal shock resistance for doors and panels made of toughened soda-lime glass for domestic appliances and other uses where thermal and/or physical shocks to the glass are likely to be encountered. Describes tests for fragmentation and thermal shock resistance, and lists available thicknesses of glass for such panels.

B.S. 3202: 1959 Recommendations on laboratory furniture and fittings. 25/–

Contains detailed recommendations on the planning and design of laboratories and on the design, material and construction of laboratory furniture and fittings with special reference to laboratory benches, fume extraction systems and piped services. Includes bibliography, index and 31 illustrations.

B.S. 3204: 1960 Harrison's bowl forceps. 4/–

Specifies requirements for Harrison's bowl forceps of 10 in., 12 in., 14 in. and 18 in. nominal size, and made of stainless steel with a screw joint.

B.S. 3207: Mineral-insulated cables. 3207: Part 1: 1960 Copper-sheathed cables with copper conductors. 5/–

Gives requirements and dimensions for copper-sheathed cables with powdered-mineral insulation and copper conductors, for general use in electrical installations. Provision is made for a PVC covering over the copper sheath, when required. Two voltage classes, 440V and 660V, are recognized. Requirements for conductor resistance, quality and thickness of insulation, conductivity and thickness of copper sheath and quality and thickness of PVC covering are given. Tests for sheath thickness, integrity of sheath and insulation resistance are included, together with voltage tests, optional bending and flattening tests and tests for the PVC covering when provided.

NEW CODES OF PRACTICE

CP 152: 1960 Glazing and fixing of glass for buildings. 12/6

This code deals with properties, design, glazing and fixing of glass in different forms in buildings. Daylighting, thicknesses, durability, fire resistance, thermal expansion and contraction, heat and sound insulation are dealt with. Recommendations are made concerning methods of fixing leaded and copper lights, special glasses, factory-made sealed units, glass domes, facings and fascias for various types of background or surround. Notes on maintenance of glass, and on corrosion at bimetallic contacts are given.

This code replaces B.S. 973 : 1945 "*Code of practice for the glazing and fixing of glass for buildings.*"

CP 221: 1960 External rendered finishes. 8/6

This code provides comprehensive guidance on modern practice in the use of cement, lime and sand mixes applied externally for protective or decorative purposes on all normal types of background both new and old. The maintenance and repair of existing rendered work are also covered. The various types of finishes are described and the importance of the nature of the background, particularly as regards strength and porosity, is stressed.

The detrimental effects of soluble salts in backgrounds and the prevention of water penetration are covered. Various factors affecting durability of rendering are also considered in relation to crazing, cracking and the effects of atmospheric pollution. The various mixes recommended for each type of finish are fully detailed and tabulated for all types of background and all exposure conditions and preferred mixes are given for most circumstances.

The code does not deal with rendering for the retention of liquids.

REVISED BRITISH STANDARDS

B.S. 336: 1960 Couplings, branch pipes, nozzles, strainers and auxiliaries for fire hose. 8/6

Gives dimensional requirements for couplings, branch pipes, nozzles, strainers, spanners, hydrant keys in aluminium, copper and copper alloy and basket strainers in wickerwork. Foam inlet adaptors are also included. Details of materials, finishes and test requirements are given.

B.S. 669: 1960 Flexible tubing and connector ends for appliances burning town gas. 5/–

Specifies dimensions, materials, marking, performance requirements and tests for the following types of tubing:

(*a*) Flexible non-metallic tubing and connector ends for domestic portable appliances.
(*b*) General purpose flexible metallic tubing for domestic portable appliances.
(*c*) Heavy duty armoured flexible tubing and connector ends.

B.S. 1389: 1960 Dimensions of hose connexions for welding and cutting equipment. 4/–

Gives dimensional drawings of threaded hose connexions, coupling nuts, coupling nipples and hose couplers for use with gas welding and cutting equipment. The threads specified are in the following BSP.F sizes: ¼, ⅜, ½, ¾ and 1 in.
Contains the long-established requirement that left-hand threads and notched hexagons are used for combustible gases and right-hand threads and plain (un-notched) hexagons are used for non-combustible gases.

B.S. 1721: 1960 Carbon tetrachloride and chlorobromethane portable fire extinguishers. 6/–

Gives the requirements for materials, construction and filling of fire extinguishers using carbon tetrachloride or chlorobromethane as the extinguishing agent. Tests and marking requirements are given.

AMENDMENT SLIPS

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

	Ref. No.
B.S. 459 Part 3: 1951 Plywood faced fire-check flush doors and wood and metal frames. Amendment No. 3	PD 3567
B.S. 1308 : 1957 Concrete street lighting columns. Amendment No. 1	PD 3577
B.S. 2092: 1954 Industrial eye-protectors for operations other than welding. Amendment No. 1	PD 3600
B.S. 2507: 1954 Rubber aprons for hospital use. Amendment No. 1	PD 3570
B.S. 2613: 1957 The electrical performance of rotating electrical machinery. Amendment No. 2	PD 3602
B.S. 2788: 1956 Fireguards for solid fuel fires. Amendment No. 2	PD 3615
B.S. 2992: 1958 Painters' and decorators' brushes for local authorities and public institutions (excluding quality of fillings). Amendment No. 1	PD 3579
B.S. 3036: 1958 Semi-enclosed electric fuses. Amendment No. 1	PD 3614
B.S. 3059: 1958 Steel boiler and superheater tubes. Amendment No. 1	PD 3565
B.S. 3078: 1959 Isolators (including selectors) for alternating-current systems. Amendment No. 1	PD 3603

PROPOSED FOR WITHDRAWAL

B.S. 735: 1944 Sampling and analysis of coal and coke for performance and efficiency tests on industrial plant.

B.S. 763: 1937 Sampling of coal with special reference to the size-weight ratio theory.

The subject matter of B.S. 735 and B.S. 763 is substantially covered in the revisions of B.S. 1016 and B.S. 1017.

B.S. 878: 1939 Code for comparative commercial tests of coal or coke and appliances in small steam raising plants.

The essential provisions of B.S. 878 will be incorporated in the revision of B.S. 845.

B.S. 1785: 1951 Thermal insulating materials for buildings.

The subject matter of this Standard is now out of date; it will be replaced in due course by specifications for individual thermal insulating materials and by a British Standard specifying the essential principles underlying the thermal insulation of building structures.

A note of any objection to the withdrawal should be sent to the Director of B.S.I. before 2nd May 1960.

PUBLICATIONS WITHDRAWN

Handbook No. 12: 1950 British Standards for water fittings.

NEW WORK STARTED

Definitions and methods of test for heat insulation (revision of B.S. 874)

Progress in the preparation of recommendations for applied thickness and of methods of test for thermal insulating materials since 1956 have made it necessary to revise and expand this British Standard so that determinations of thermal conductivity can be made more precisely and methods included for specific heat and other properties.

Lighting fittings for examination purposes in hospitals

This specification is being prepared at the request of the Hospital Equipment Standards Advisory Committee and will cover mobile and static lighting fittings used in hospitals for examination purposes in wards, operating theatres, etc., and will include requirements for photometric, thermal and mechanical performance.

It is proposed that tungsten filament lamps operating at a low voltage shall be used for the fittings, to avoid the risk of explosion in anaesthetic atmospheres.

Requirements relating to methods of mounting are also being considered.

Lighting fittings for general purposes

Requirements for general-purpose lighting fittings of all types including fittings for use with tungsten filament lamps and with discharge lamps, including tubular fluorescent lamps, are to be considered. It is intended to distinguish between mandatory requirements with tests for ensuring safety and reliability and recommendations for good practice in regard to design and performance.

Since the performance will normally vary according to the intended use of the fitting, recommendations for the specification of performance and the tests necessary to ensure compliance with this are being considered.

Hospital bedside lockers (revision of B.S. 1765)

Revision to bring the standard more into line with current hospital practice.

REVIEWED AND PROPOSED FOR CONFIRMATION

Lancashire and Cornish boilers of riveted construction (with amendment to be issued shortly) (B.S. 537: 1951)

Horizontal multitubular boilers of riveted construction (with amendment to be issued shortly) (B.S. 609: 1951)

Vertical cross tube boilers of riveted construction (with amendment to be issued shortly) (B.S. 665 : 1951)

Vertical multitubular boilers of riveted construction (with amendment to be issued shortly) (B.S. 761 : 1951)

Loco-type multitubular boilers of riveted construction (with amendment to be issued shortly) (B.S. 931 : 1951)

DRAFT STANDARDS CIRCULATED FOR COMMENT

A 3971 Stretchers and stretcher carriers (revision of B.S. 896). [3 pp.]

IMPORTED ELECTRICAL APPLIANCES—A WARNING ABOUT SAFE USE

The possibility of accidents arising through the use of imported electrical appliances with flexible cords having the earthing core coloured red, has for many years been recognized by the B.S.I.

The Institution of Electrical Engineers recently issued a warning notice on this subject, following several recent instances of shock.

The statement drew the urgent attention of vendors and users of imported domestic electrical apparatus, photographic and projection equipment, tape recorders, etc., to the risks " which may ensue if the coding of the cores of the flexible cord with which such apparatus is furnished differs from the established British coding set out in the Institution's Regulations for the Electrical Equipment of Buildings, that is to say:

Green — earth connection
Red — phase (live) connection
Black — neutral connection

" The risk is most acute if the flexible cord provided with the apparatus has a core coloured red which serves as its earth connection; because if the user, following established British practice, connects this core to the terminal of a British connecting plug which may itself be marked red, and then inserts the plug into a normal British socket, the result will be that any exposed metal parts of the imported apparatus connected to the red core will be charged at mains voltage, and represent a serious hazard."

Over three years ago, the British delegation attending meetings of the International Commission on Rules for the Approval of Electrical Equipment (usually known as the CEE) proposed that an attempt should be made to obtain international agreement on the use of green for identification of the earthing core in flexible cords.

Such agreement has not, up to the present, been possible as green is used in some countries as a phase colour. The CEE has, however, recommended that the colour combination green/yellow should be used for identifying the earthing core of flexible cords, and consideration is at present being given in Britain to the possibility of recognizing this colour combination as an alternative to plain green. Practically all the other member-countries of the CEE have already indicated that within the next two or three years they will adopt the green/yellow combination either as their national standard or as an alternative thereto.

The proposal has now been submitted by the CEE to the IEC (International Electrotechnical Commission) for consideration as a world-wide standard.

There is thus the prospect that, in the not too distant future, 3-core flexible cords attached to imported electrical appliances will have the earthing core coloured green/yellow, and the potentially dangerous situation due to the use of red for this core will be eliminated. Until this comes about, however, B.S.I. fully endorses the statement made by the IEE.

A scheme for providing a central oil fired boiler plant at the Whittington Hospital, London, N.19, has been approved by the Ministry and will cost approximately £153,000. The existing boiler house site at St. Mary's Wing will be used for the new plant and steam mains will be run to the Archway and Highgate Wings where they will be connected to existing headers.

On the Market

A review of new equipment and materials and their development

Mr. J. L. Dennis demonstrates his walking machine complete with parallel bars for convalescent or disabled patients.

BLIND MAN DESIGNS WALKING AID

A simple machine that can be used to teach convalescents to walk again, or to tone up muscles that have not been used for some time, has been designed by a partially blind Londoner.

The machine was originally constructed as a trainer for walking and running races by Mr. J. L. Dennis of London Road, Croydon. It consists of an endless belt over rollers mounted on a Dexion frame.

Mr. Dennis, whose eyes were damaged during the war, found it necessary to train at home for his long distance athletic events, so he designed a walking machine. By the use of a strap worn around the waist and attached to a bar at the rear of the machine it is possible to speed up from a walking pace to a sprint.

For use as a therapy unit the rear bar is easily removed and replaced by parallel bars along the sides. These can be adjusted to suit adults or children.

NEW "SPINNER" WINDOW FOR AIR CONDITIONED BUILDINGS

With Air Conditioning still very much a thing of the future, **Williams & Williams** have produced a new aluminium window meeting the problems involved.

In order to keep conditioned air from escaping into the outside atmosphere a double neoprene weather stripping is incorporated into the moving frame.

To reduce heat loss and noise to the minimum, provision is made for the window to be double glazed.

When cleaning is necessary this can be done from the interior of the building. After cleaning the inside surface the operator unlocks the window with a key, reverses and re-locks it in an inside-out position. The other side of the glass is then cleaned in complete safety from inside the building with the minimum loss of conditioned air. As both sides of the moving frame are identical it remains in the same position until due for the next clean.

Incorporated into the fixed outer frame is a moving bar mechanism operated by a removable key. When the key is turned, the bar mechanism thrusts an aluminium channel into the outer frame firmly against the double neoprene seal. *All four*

The window and key in the locked and unlocked positions.

sides of the aluminium channel move simultaneously with one turn of the key. To reverse, the window spins about a central vertical pivot—hence the name " Spinner." Construction is in HE9/WP aluminium extrusions.

The new window is on view at the Williams & Williams showroom at 36, High Holborn, London.

The finger-tip operation of the Mancuna swing door is well illustrated here.

A NEW TIMBER FRAMED FLEXIBLE SWING DOOR

An entirely new flexible swing door to be known as the " Manby " door has recently been announced by **Mancuna Engineering Ltd.**, of Denton, Manchester, the originators of the industrial type flexible door in the United Kingdom. The new door has the unique and particularly attractive feature of a timber frame, generally in mahogany or oak of pleasing and simple design.

The new " Manby " door is suited to all internal applications where pedestrian or light-hand propelled trolley traffic is experienced; where severe draughts have to be accommodated or heavier traffic such as the fork-lift truck etc., is concerned, standard or heavy duty metal framed doors are, of course, in general use.

For internal application where silence in operation, attractive design, colour and " see-through " vision are of special significance, the new door illustrated in the photographs will be of particular interest. Doors can be fixed as replacements for doors in existing buildings. Main frame and window frame in timbers other than mahogany and oak can be supplied at extra cost. An attractive feature of these doors is that they are available in black and white and in a wide range of colours including opaline green, turquoise blue, peacock blue, light olive green, salmon pink, yellow, red and orange.

The use of double action helical type hinges provides for 180° opening. No kicking plates or other door " furniture " are necessary and considerable economies are claimed in the elimination of annual maintenance and polishing costs generally experienced with conventional wooden swing doors. Installation is carried out as for any swing door fitted with similar hinge mechanism. It is understood that the doors are available for openings up to 7 ft. 6 in. high × 7 ft. 6 in. wide.

Full particulars and descriptive literature are available from Mancuna Engineering Ltd.

IMPROVED AND NEW CALOMAX BOILERS

Calomax of Leeds introduced in 1947 the patent instantaneous steam operated type of water boiler that is so widely favoured today for speedy bulk tea-making.

The changing needs and quickened tempo of users however, even over the last five years, have provided the makers with valuable new background information for the improved design features and new types they now announce. Ten years ago the Calomax range comprised three models, mainly for hospital tea-making. Today with 18 models the firm claims the biggest range of steam operated water boilers on the market.

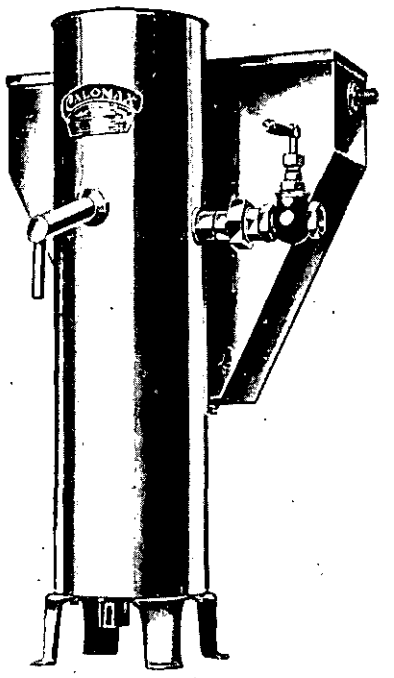
These major factors have influenced the new Calomax boiler designs and modifications.

(*a*) Maintained efficiency from water boilers operating in hard water districts.

(*b*) The wider use of low pressure steam operation.

(*c*) The need for a general speed up of tea-making operations.

On (*a*) Calomax have met these problems by protected design for modification to interior, and improved external features in the form of quick release detachable heads, removed and replaced in a matter of seconds; these make it simple and no longer irksome to maintain the boiler in a clean and healthy condition. Descaling can easily be carried out with the boiler in situ.



One of the new range of Calomax water boilers.

Regarding (*b*) an entirely new range of boilers in various sizes and outputs has been made available to operate on pressures as low as 5 to 40 p.s.i. with outputs of 5 to 20 pints per minute, and comparable to the maximum outputs previously obtainable from boilers with higher steam pressures. Outstanding is the new Q.R.10 model specially introduced for works which operate on exhaust steam, or institutions on restricted steam pressures.

The improved new Calomax models, when operating on medium steam pressures, now produce up to 32 pints per minute if required. This represents an output increase of approximately 50% over previous models of a similar physical size.

An interesting constructional feature of the Calomax boilers is the breather arrangements which prevents free circulation of steam vapour in confined areas. Excessive humidity is therefore prevented.

GAS COOKERS FOR THE HANDICAPPED

With a few simple aids handicapped people today lead busy, useful lives, tackling odd jobs in the home or carrying on household duties, and many of them like to cook a meal for themselves. A gas cooker, in two models, the "G.C.1" and "G.C.2," has been specially designed to help them.

This cooker, designed by the Gas Council, is manufactured by **Messrs. Sidney Flavel & Co. Ltd.**

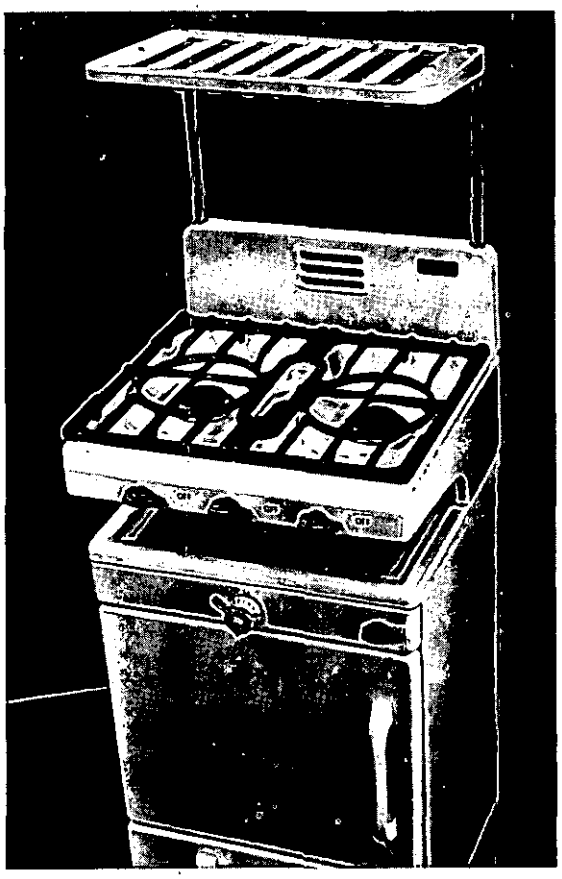
The cooker can be bought at a cash price of about £30 (excluding fixing) or on hire purchase terms.

It will also be possible, on recommendation, to obtain the cooker on hire at a rental of 2s. 6d. a week, including fixing. The National Assistance Board and the Society of Medical Officers of Health have agreed to co-operate by identifying and recommending to the Gas Boards people to whom the cooker will be of help.

As initial production is limited these arrangements will ensure that it reaches persons to whom it will be of the greatest help.

These include people who may be confined to a wheelchair, or someone who has not the full use of their hands or with defective sight and, in particular, elderly and infirm people living alone, for it is among the elderly that the largest proportion of all accidents in the home occur.

The "G.C.1" cooker is similar in appearance to the usual gas cooker. As an alternative to the "G.C.1" the "G.C.2." cooker is planned so that



Designed for the Gas Council to help handicapped persons, this cooker has a number of special features.

the oven and hotplate can be side by side. Both have several devices to assist those using them.

All the burners on the cooker hotplate will light automatically when a tap is turned, being fitted with small gas pilots. To light the oven, it is only necessary to apply a light to an aperture in the oven base plate. This is placed near the front to reduce stooping. All the burners are designed so that if the pilot is not alight the main gas will not leave any burner.

Gas taps have handles with lever extensions which, if these cannot be grasped with fingers, can be turned with the elbow or the back of the hand. A large handle is fitted to the oven door which is shut by a latch and opened by a direct pull.

The oven thermostat head also has a lever extension and the numbered settings can be identified by touch and hearing—each setting " clicks " when turned, a useful aid for anyone with defective sight.

NEW HEAVY DUTY ELECTRIC VALVE ACTUATOR

A heavy duty electric motor for operating butterfly and rotary stem valves, dampers and louvres or vertical acting slip stem valves, is now available from **Honeywell Controls Ltd.**

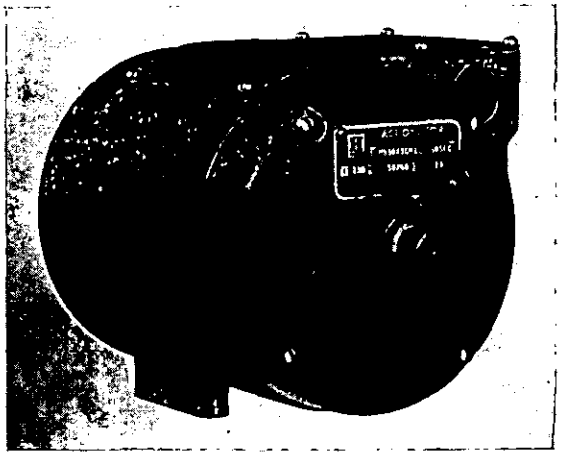
Known as the " Actionator," it consists of a reversing capacitor type motor with a gear train to give the required timing. Various speeds are available ranging from 9·0 secs. to 144 secs. for 180° rotation or full stroke operation. Torque output is high—up to 200 pounds inches and there is an internal brake to hold the load in any position without " hunting " or " coasting " when the motor is de-energised.

Models of the " Actionator " are available for two-position, floating or proportional control action.

Cam-operated micro switches control the extent of motor travel in either direction and up to four auxiliary switches of the same kind can be incorporated. A re-transmitting slidewire can be substituted in the proportional control model.

The " Actionator " is ruggedly constructed—all components are housed in a die-cast aluminium housing; it will work continuously without loss of efficiency in ambient temperatures as low as 25°F. and as high as 150°F.; it requires no maintenance.

Specification Sheet S804-3 gives full details and is available on request from Honeywell Controls Ltd., Ruislip Road East, Greenford, Middlesex.



The Honeywell " Actionator " electric motor designed to achieve stable control of valves, dampers and louvres, etc

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THE VOKES " RENOVAIR "

Vokes of Henley Park, Guildford, Surrey, have introduced an entirely new type of filtration unit which is the latest addition to their well known range of air filters.

The " Renovair " smoke and airborne contaminant removal unit is the result of intensive research and development of high efficiency filtration equipment for the U.K. Atomic Energy Authority and other industrial concerns engaged in the nuclear energy field. This accumulated knowledge was applied recently to the development of smoke removal filter systems under an Admiralty development contract for H.M. Ships. The performance of these installations has enabled them to produce the " Renovair " for commercial use.

This compact unit offers unlimited possibilities for use wherever smoke concentrations and atmospheric pollution are a nuisance and injurious to health.

The heart of the " Renovair " is a 5 in. deep Vokes 44 " Absolute " filter panel which is housed in a metal case with an integral fan, electric motor and built-in acoustic chamber to ensure quiet operation. The " Absolute " panel has a paper element, specially made from cellulose and asbestos fibres, folded into a deeply pleated form and cemented into a wooden case. The unit is suitable for either wall or floor mounting and requires only electrical power supply, single phase, 200-250 volts, 5 amps.

The " Renovair " can either be used continuously or as needed. Tests have shown that an average size room (30 ft. × 20 ft.) can be cleared of smoke and airborne contaminants down to $\frac{1}{2}$ micron particles in a few minutes.

Notes for Members

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

PROCEEDINGS OF THE INSTITUTION

At a meeting of the Institution held at 45, Great Russell Street, London, W.C.1, on January 29th, 1960, the following elections were approved:—

Member

Henry Batey, East Midlands Branch.
P. A. Flanigan, London Branch.
Sydney Joseph Gridley, Yorkshire Branch.
Rhys Horace Lloyd, London Branch.
Ernest James Moodie, Mid-Scotland Branch.
Harold Anthony Magnee, London Branch.
John Pedley, Glasgow Branch.
William John Phipps, Southern Branch.
Norman Shannon, London Branch.
Cyril Douglas Simons, Midlands Branch.
Eric Leslie Taylor, Mid-Scotland Branch.
William Francis Thomas, East Midlands Branch.

Overseas Member

Kenneth Clark, Lagos, Nigeria.
Leonard Thomas Thorn Sullivan, Ibadan, Nigeria.

Associate Member

Edward Frank Austin, Midlands Branch.
Arthur Vernon Baker, Midlands Branch.
William Caldwell, Glasgow Branch.
Dennis James Chappell, West of England Branch.
David Moffat Milne Croy, Glasgow Branch.
Lawrence Reginald F. House, Southern Branch.
Alexander McNiven, Glasgow Branch.
Stanley Maitland Steel, Mid-Scotland Branch.
Maurice Anthony Thorp, Yorkshire Branch.
John Kenneth Brian Turk, London Branch.

Transfer to Full Membership

Robert Alec Sturdy, London Branch.

Overseas, Transfer to Full Membership

Anthony Donald Croydon, Lagos, Nigeria.

THE TREASURER— AN IMPORTANT REQUEST

Mr. R. G. Rogers, the Deputy Secretary and Treasurer, wishes to draw the attention of all Members to this request:—

When communicating with the Deputy Secretary and Treasurer, will *all* Members on *all* occasions please quote their membership numbers in addition to their names. This will expedite the work in his hands and lessen the risk of errors which can so easily occur when the membership number is not given.

THE 1960 SANDFORD PREMIUM LECTURE

The Meyerstein Memorial Lecture Theatre at the Westminster Hospital Medical School, London, S.W.1, is this year's venue for the Sandford Premium Lecture. It will take place at 2.30 p.m. on Saturday, April 9th, and will be given by L. R. West, Esq., M.B., M.R.C.P. Dr. West, who is Consultant Chest Physician at Sully Hospital, Glamorgan, has chosen as his subject " Some Engineering Principles in Medicine." A short film will be included.

The meeting has been widely publicised and invitations have been extended to a number of professional bodies as well as to the Medical Press. All visitors will be welcome, whether accompanying Members or attending independently, and it is very much hoped that wherever possible Members will make a special effort to be present.

A brief synopsis of Dr. West's paper is as follows:

Many of the remarkable recent developments in medicine could not have been possible without the application of engineering principles, and, in modern research into such subjects as aviation and space medicine, open heart surgery, etc., the engineering and medical sciences are closely linked.

The speaker will mention some of the instruments and methods used in measuring various biological phenomena such as the heart action, brain activity, temperature, pressure curves in the heart and blood vessels, flow rates, etc. This will lead on to a discussion on how the patient's circulation may be taken over by an artificial heart-lung machine, describing open heart surgery and mentioning some of the future possibilities opened up by the co-operation of the engineer and doctor.

THE ANNUAL CONFERENCE, ETC.

Contrary to the hope expressed in our February issue, we learn that the Yorkshire Branch has decided that it is unable to sponsor a two-day school at Harrogate in June. The first item on the programme for Members, other than those serving on Council or committees, will therefore be the Annual Dinner at the Cairn Hydro Hotel on Friday, June 10th. The Dinner will be at 7.30 p.m. for 8 o'clock. (*Continued on page 72*)

SOUTH WALES BRANCH

Mr. H. F. H. Dolling has succeeded Mr. W. G. Owen as Hon. Secretary of the Branch.

Mr. Dolling's address is :—

8, Lon Coed Parc,
Sketty,
Swansea,
Glamorgan.

Continued from page A.26)

ST. CRISPIN HOSPITAL, DUSTON, NORTHAMPTON

Applications are invited for the following posts:—

(1) SUPERINTENDENT ENGINEER who will be responsible for the satisfactory operation, maintenance and co-ordination of the Engineering Services and activities, both Mechanical and Electrical, of a mental hospital.

Applicants must have completed an apprenticeship in General Mechanical Engineering or equivalent and be fully experienced in the maintenance and efficient operation of Major Central Boiler Plants, Ancillary and Laundry Equipment, and in the keeping of records needed for the control of Engineering Staff, Plant Services and Equipment; they must also hold one of the following qualifications or an equivalent qualification approved by the Ministry of Health or the Secretary of State for Scotland :

(a) M.T.C.A. First Class Certificate of Competency in Marine Engineering.

(b) M.T.C.A. Certificate of Service as First Class Engineer.

(c) City and Guilds Full Technological Certificate in Plant Engineering (First Class).

Salary, which is at present under review—£890 to £1,045 per annum.

(2) BUILDING SUPERVISOR who will be responsible for the building maintenance work of the hospital, including the preparation of Specifications and Contracts for such work, the preparation of Building Maintenance Estimates, direction of building trade labour (approximately 40 tradesmen), preparation of Drawings, Specifications and Contracts for Minor Capital Works and supervising the execution of Capital Works of moderate size and the maintenance of such records, etc., as required. Applicants must have served a full apprenticeship followed by experience as a craftsman in an appropriate trade and must also have had experience as General Foreman in the carrying out of Buildings Contracts. The Ordinary National Certificate in Building or a comparable qualification is desirable.

Salary: £790 to £940 per annum.

There is a house available on the hospital estate for one of the successful applicants.

The terms and conditions of service are governed by the Whitley Councils for the Health Service (Great Britain) and the salaries are based on a bed or pointage basis. A new Mental Deficiency Hospital for 400 beds is to be built to come within the control of both appointments.

Applications must be on a form to be obtained from the undersigned and returned not later than 15th April, 1960.

F. J. CURTIS,
Group Secretary.

St. Crispin Hospital,
Duston, Northampton.

MARSTON GREEN MATERNITY HOSPITAL BERWICKS LANE, MARSTON GREEN, Nr. BIRMINGHAM

ASSISTANT ENGINEER required. Applicants must have completed an apprenticeship in Mechanical Engineering and have sound knowledge of the principles and practice of Hospital Boiler Plant, Engineering and Electrical services generally.

Preference will be given to candidate who has studied for the Ordinary National or its equivalent.

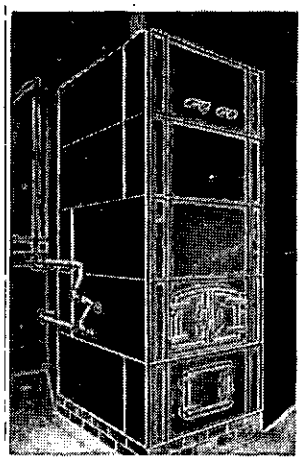
Salary £545 rising to £670 p.a. Post permanent and superannuable. Applications, giving full details and naming three referees, to Hospital Secretary within 21 days.

MISCELLANEOUS

Forklift Trucks. Petrol and Electric models. Electric Factory trucks and stillage trucks on solid rubber tyres. Stacking Machines. Elevating Machinery. Comprehensive list. Speed Electrics, Dept. H.E., Church Street, Basford, Nottingham. Tel. 75716.

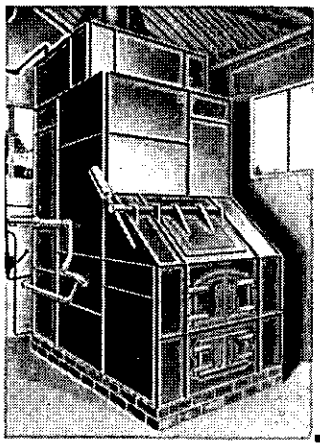
HOSPITAL CASTORS and WHEELS.—All kinds Supplied—Also Repairs and Rerubbering. Grosvenor (Castor) Mfg. Co. Ltd., Beales Street, Aston, Birmingham, 6.

Conforms to smoke emission limits of Clean Air Act, 1956



STANDARD INCINERATOR Types CD&E

STANDARD INCINERATOR Types A&B



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GENERAL PURPOSE INCINERATOR

ENDS FOREVER THE SMOKE AND SMELL PROBLEM

The smoke and smell from incinerators, and from industry generally, has long been a public nuisance. The Clean Air Act lays down fixed limits governing smoke emission, and Hospital Authorities have been forced to find ways of answering the problem. And now, after extensive research and experiment, Gibbons Askam have produced an Incinerator which deals smokelessly with all types of waste. Incorporating a patented Catalyst which eliminates smoke emission, the Incinerator is available in two designs, providing between them five different capacities to cover all requirements.

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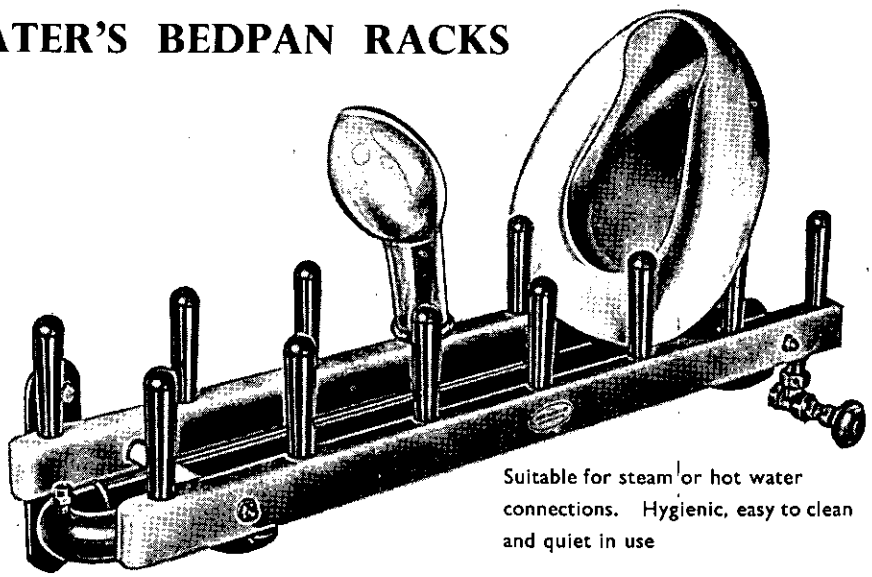
Phone: Whitehall 6417/8.

SLATER'S BEDPAN RACKS



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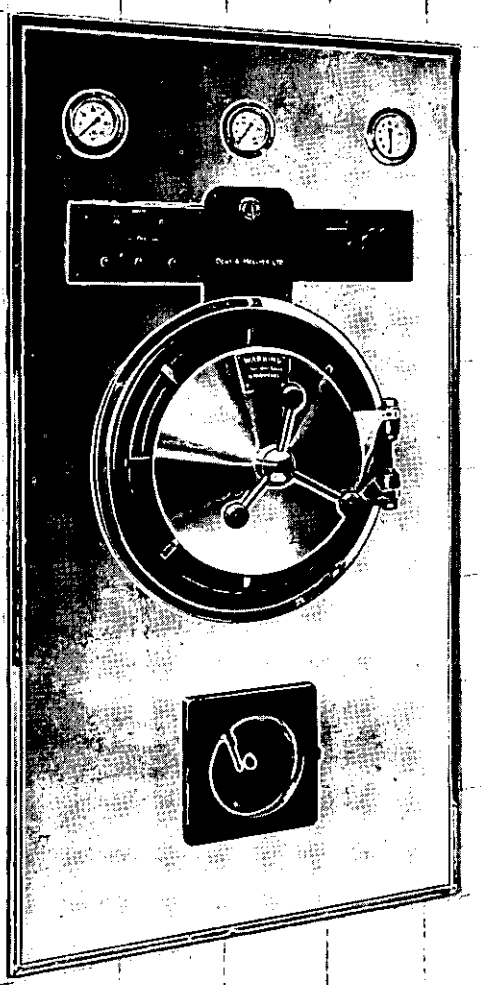

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