THE HOSPITAL ENGINEER

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THE INSTITUTE OF
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VOL XXII No 12
DECEMBER 1968

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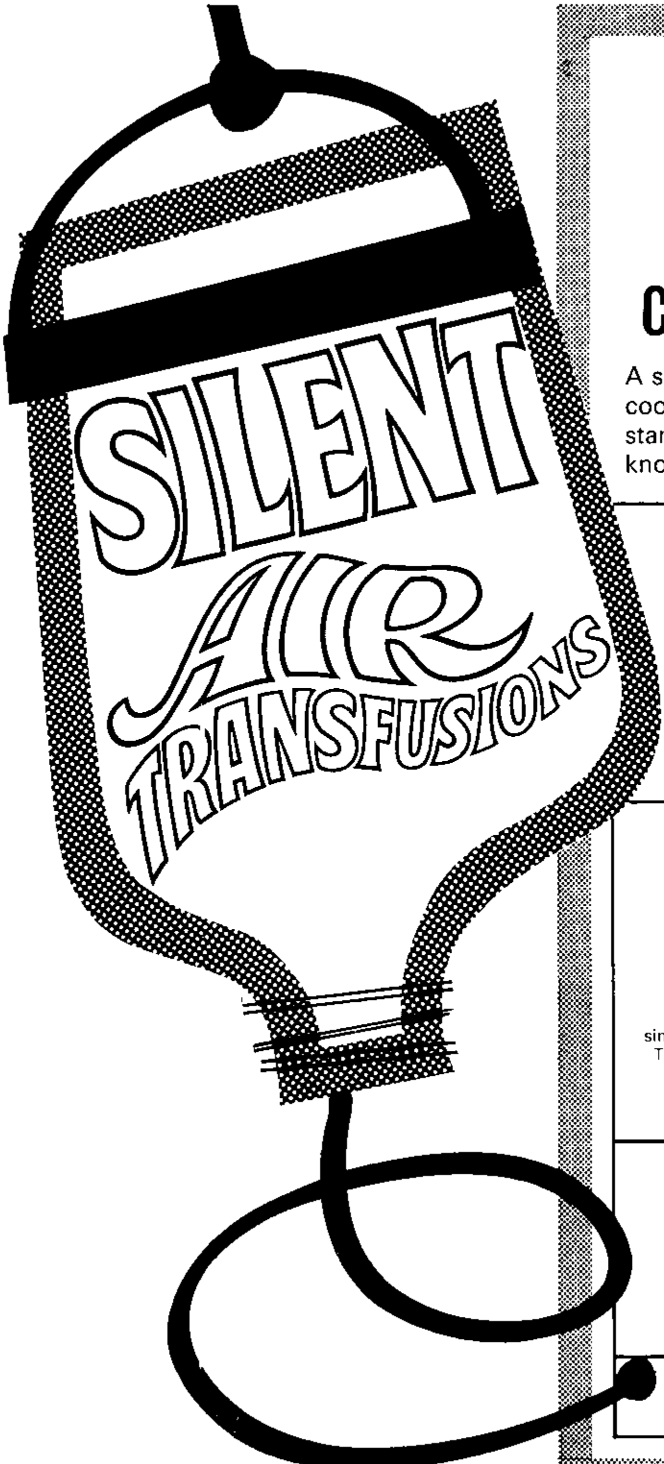
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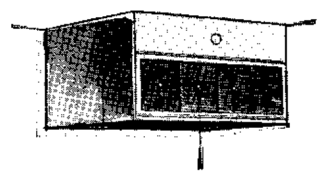

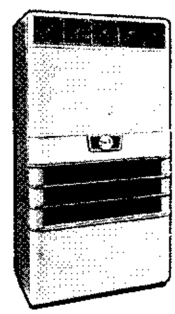

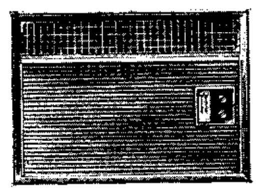

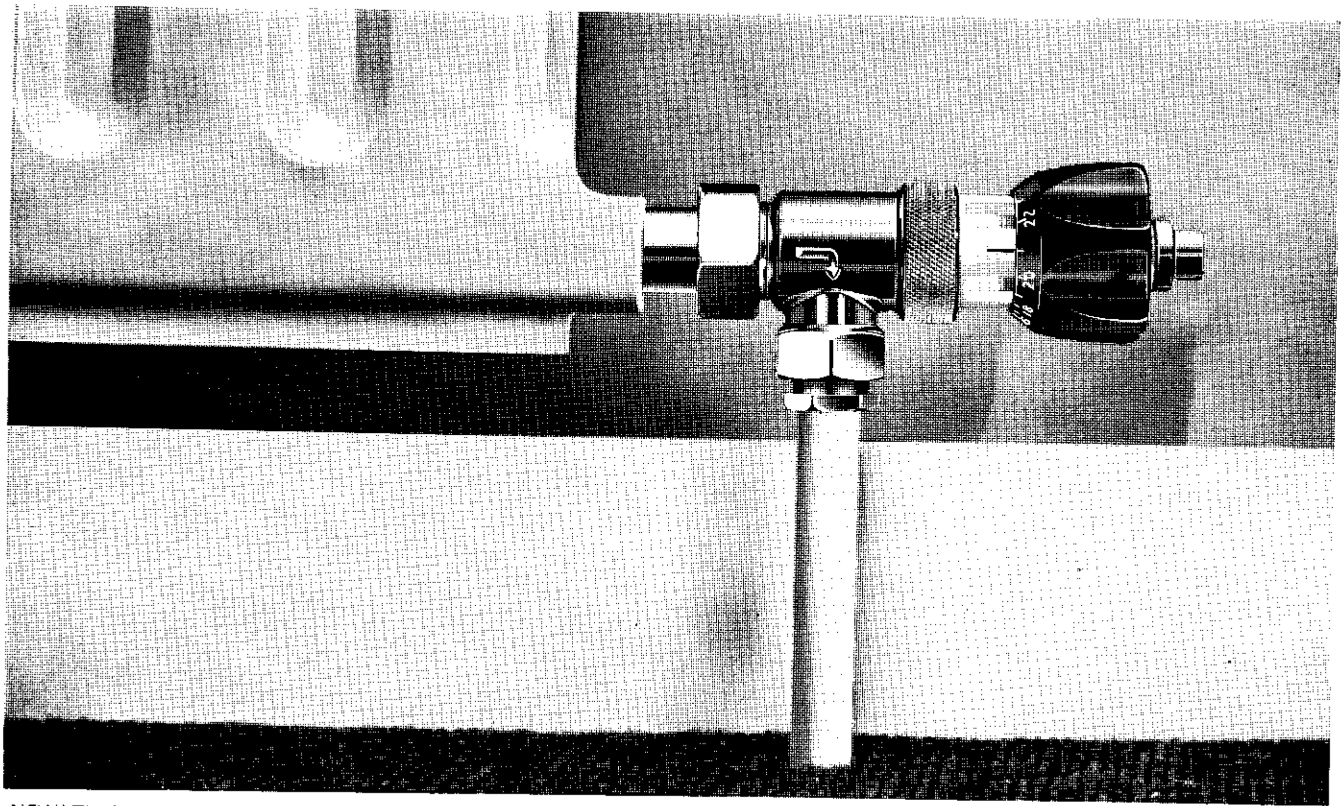

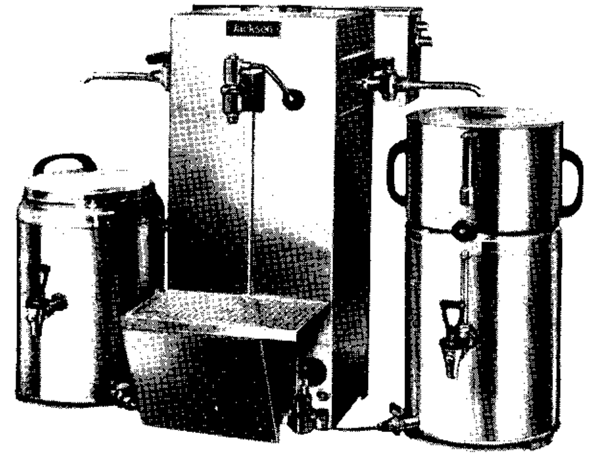

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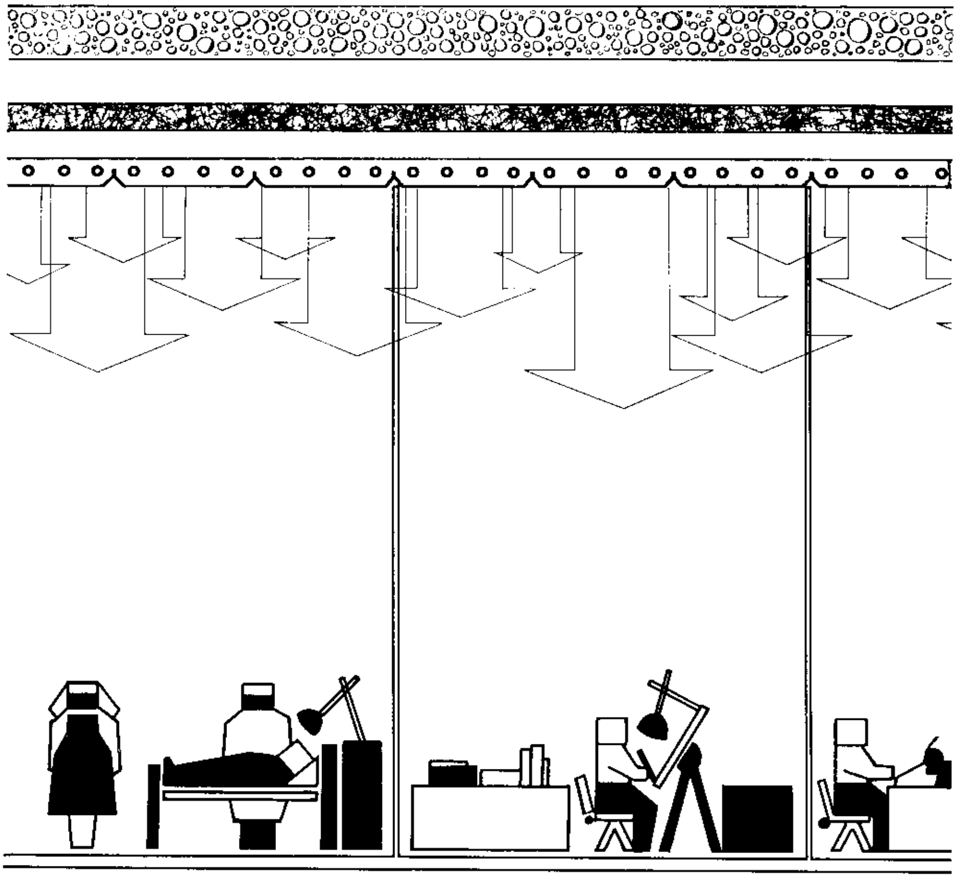

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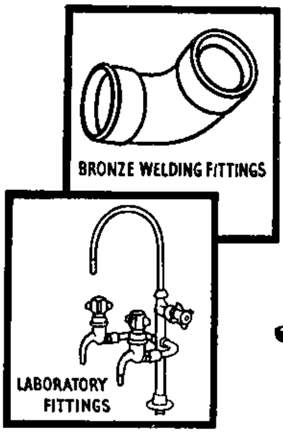

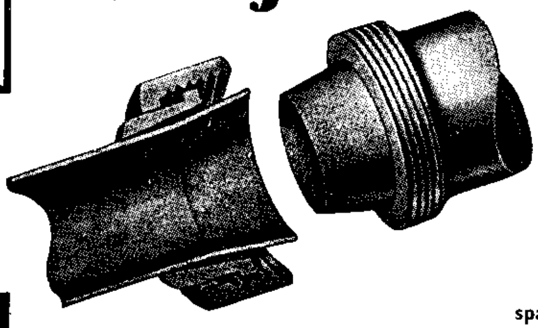

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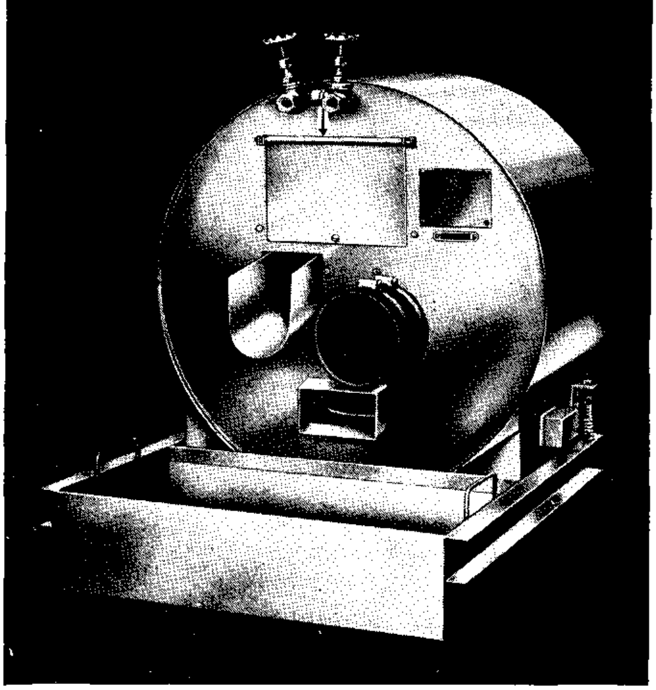

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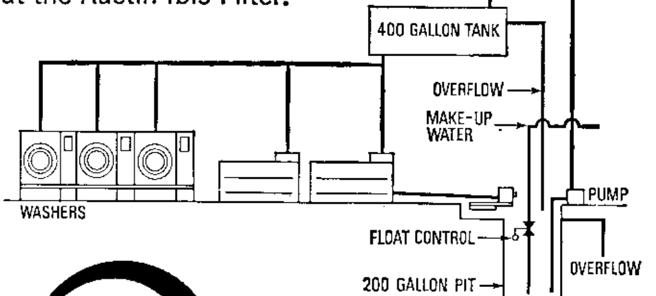

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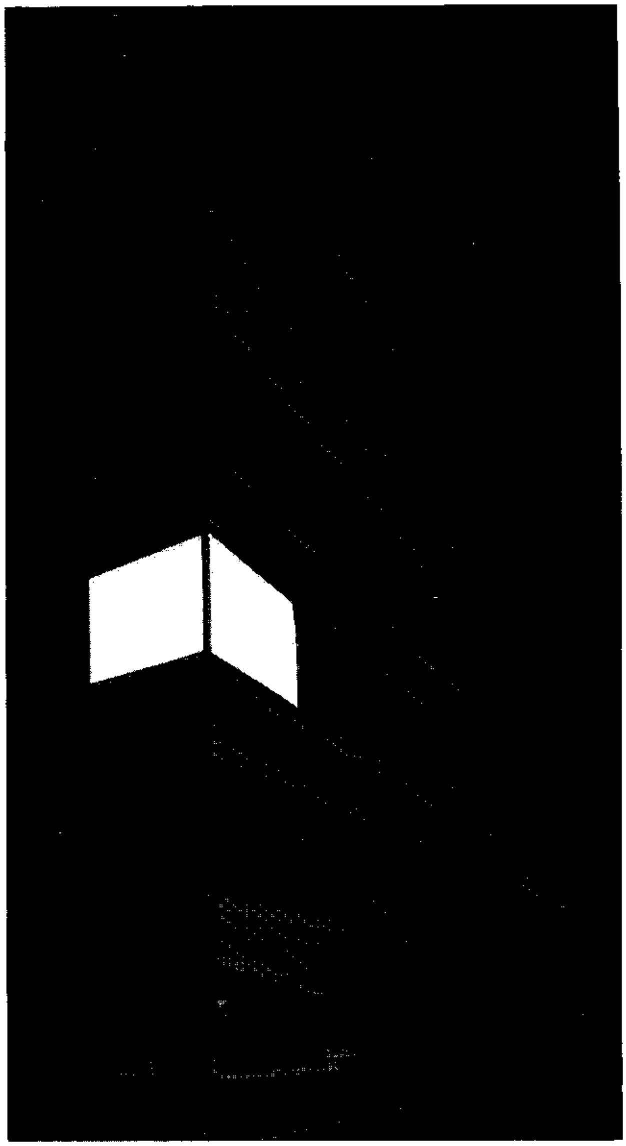

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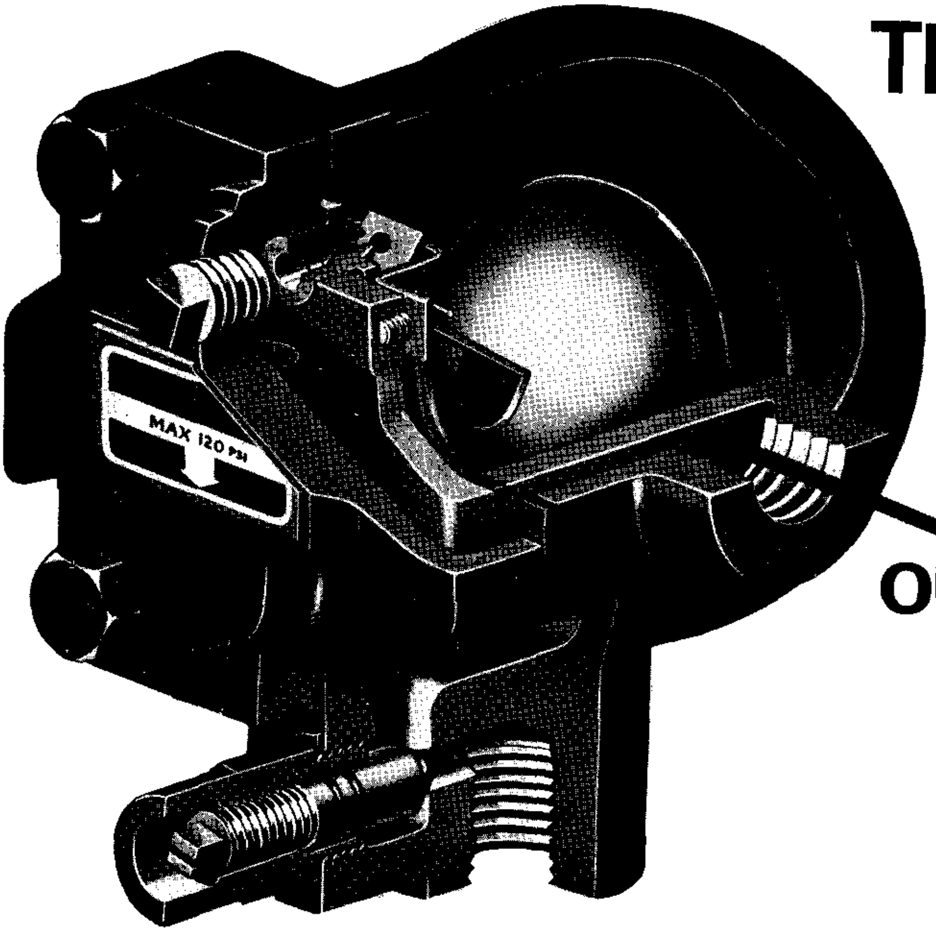

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THE JOURNAL OF THE INSTITUTE OF HOSPITAL ENGINEERING

VOL XXII No 12
DECEMBER 1968

The Design of Hospital Disposal Chutes

DECELERATION TRACKS

By GEORGE BAIRD, M.Sc., A.M.I.H.V.E., M.R.S.H.
Building Services Research Unit, University of Glasgow

A short note on the design and the results of tests on a six-inch model

1. Introduction

ONE of the problems associated with disposal chutes is how to slow down and stop the material which has descended from the entry points at higher floors. This should be done in such a way as to minimise the possibility of bags containing linen or refuse bursting, and at the same time reduce the danger, to personnel working in the chute exit room, of injury from descending bags.

At most of the hospitals visited during a recent survey of existing chute installations[1], the chute was terminated at, or slightly below, ceiling level. The material from the chute dropped straight out onto the floor, or into a container. However, at some installations, a 90° bend was fitted at the bottom of the chute which helped to slow down the descending material, though sometimes the bags could be projected horizontally after dropping four or more floors. Clearly, the simple drop-out cannot be considered satisfactory from either of the points of view mentioned earlier (i.e. damage to bags and danger to personnel) and the 90° bend only goes part of the way towards solving the problem.

This Paper and the Paper published on pages 217-221 of our October issue form the basis of a paper given to the Institute's Scottish Conference on October 3rd, 1968.

2. Cramfelt's Deceleration Track

The best arrangement seen was at a Swedish hospital where descending bags were turned progressively in the horizontal and vertical planes on a specially designed "deceleration track" which had a semi-circular cross-section. The bags dropped off the track, onto the floor, when they stopped sliding. This chute installation was over 100 ft. high and the use of the deceleration track, in conjunction with two-layer paper bags for linen and refuse, resulted in 100 per cent undamaged bags. Before installation of the track, it was found that about 70 per cent of bags were damaged on impact with a drop of only 50 feet. This work[2] was reported over five years ago and Figs. 1 and 2 are reproduced from it to illustrate the general layout.

The track itself was made of heavy gauge steel plate fabricated from 4-inch pieces, semi-circular in section.

Since this would clearly be expensive to construct, it was decided to conduct a series of tests, using a 6-inch diameter model chute, to discover the performance characteristics of a modified deceleration track based on the same design. At the same time, it was hoped to develop a more versatile layout with a predictable performance.

3. Model Tests of Deceleration Tracks using a Six-inch Diameter Chute

After consideration of several methods of slowing down the descending bags the type of track selected for test consisted simply of sets of 90° semi-circular section bends, each made up from six straight sections. Figs. 3 and 4 illustrate these bends, Fig. 3 the 30-inch radius bend and Fig. 4 the 15-inch radius bend.

Four of each of these bends were constructed and Fig. 5 illustrates the method of assembly used to make up the complete deceleration track. Clearly, the track could be made up of any combination of these bends and have straight sections interposed if required.

For the experimental design, the following parameters were selected at the levels specified below:

(*a*) *Deceleration Track Layout*—Three track assemblies were tested, viz.

Track No. 1—comprising four 30-inch radius bends

Track No. 2—comprising four 15-inch radius bends

Track No. 3—comprising an initial 30-inch bend and three 15-inch bends

(*b*) *Bag Size*—Two bag sizes were chosen:

No. 1—approx. 5 inches outside diameter (c.f. 6-inch diameter chute), 10 inches high

No. 2—approx. 3·2 inches outside diameter, 7 inches high.

The bags were robustly constructed, consisting of an inner terylene bag with two layers of hessian outside. This construction was adopted since the bags were to be dropped down the chute many times during the tests.

(*c*) *Bag Weight*—Lead shot, contained in 1-lb. packets, was used to load the bags as follows:

5-inch diameter bag—5 lbs., 10 lbs., 15 lbs., and 20 lbs.

3·2 inches diameter bag—5 lbs. and 10 lbs.

(*d*) *Height Dropped*—Due to site limitations (the 6-inch diameter chute was built alongside an external fire escape stairway) the maximum height available was about 65 feet. Generally, the bags were dropped from heights of 10, 20, 40 and 65 feet, with occasional trials at 30 and 50 feet, the distance being measured from the top of the deceleration track.

Each bag was dropped three or four times from each height and the distance which it travelled along the track was measured. This measurement was taken at the point

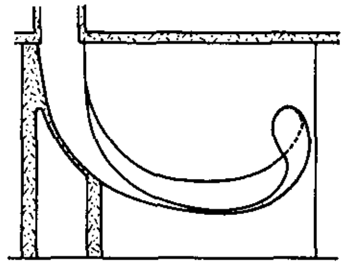

Fig. 1. Elevation of Swedish Deceleration Track (Cramfelt).

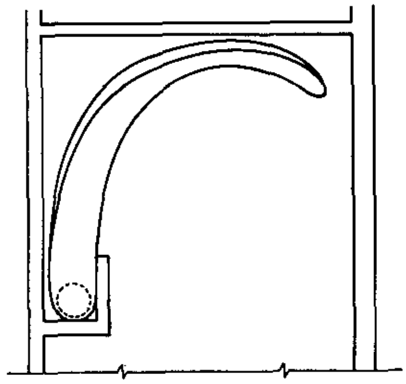

Fig. 2. Plan View of Swedish Deceleration Track (Cramfelt).

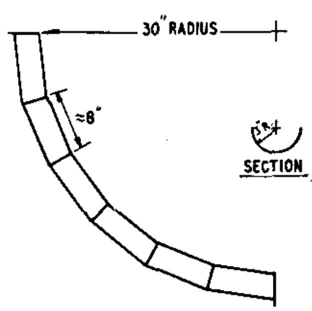

Fig. 3. 30-inch Radius Bend—made up of six straight sections, each approximately eight inches inside length.

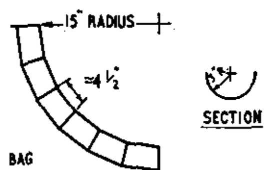

Fig. 4. 15-inch Radius Bend.

NOTE:- THE DISTANCE MOVED BY A BAG ALONG THE TRACK WAS MEASURED AT THE INNER EDGE (SEE FIGS 6,7 & 8.)

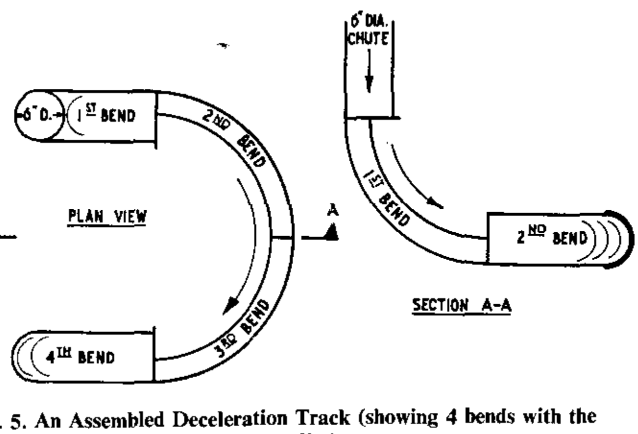

Fig. 5. An Assembled Deceleration Track (showing 4 bends with the same radius).

reached by the leading edge of the bag before dropping off the track. The mean value was plotted on the graphs of results which follow. Generally speaking, these measured distances were extremely consistent, normally being within about an inch of each other.

The test results are shown on Figs. 6, 7 and 8 for the different track constructions and bag sizes. On the upper part of each figure the distance travelled along the track by each bag is plotted graphically against the height dropped. The same results are shown pictorially in the lower part of each figure.

4. Discussion of Results

4.1 *Track No.* 1 (4×30″ *radius bends—Fig.* 6)

It can be seen from the figures that, as one might expect, when the height dropped increases, the distance travelled by the bag along the track increases, but at a gradually reducing rate. This would tend to indicate that the bag would eventually attain some terminal velocity. It can also be seen that, as the weight of the bag increases, the distance travelled by it along the track increases at first, but then reverses, indicating possibly that there is some interaction between the forces causing the bag to move along the track and the forces causing friction between bag and track. Finally, for the two weights tested, it can be seen that as the bag size decreases, the distance travelled by it along the track increases. This phenomenon is probably due to the reduction of the pressure forces in front of the smaller bags (due to their smaller frontal area and length) which would allow them to descend faster.

In no case did the bag reach the end of the third bend, and the indications are that this is unlikely to happen, even with drop heights considerably greater than 65 feet and with heavier bags.

4.2 *Track No.* 2 (4×15″ *radius bends—Fig.* 7)

The test results here were similar to those of Track No. 1, except that the variation in distance travelled along the track with bag weight at first appeared rather less systematic. This was probably due to the smaller radius bends used for those tests.

However, with both sizes of bag, the distance travelled by the 10 lb. bags was less than that with the 5 lb. bags. The 15 lb. and 20 lb. bags both illustrated fairly steep characteristics, i.e. the distance travelled along the track increased only slightly for a large increase in height dropped.

One important feature noted was that the initial bend was badly distorted by the impact of the 15 lb. and 20 lb. bags when they were dropped from 65 feet. In this case, the bends were supported at each end only.

4.3 *Track No.* 3 (1×30″ *radius*+3×15″ *radius bends—Fig.* 8)

The results here were virtually identical to those for Track No. 1 as regards the effects of height dropped, bag weight and bag size. It is possible that this is due to the influence of the initial bend which is probably more important than subsequent ones. Certainly, most of the deceleration appears to take place on the first bend (when attempts to observe the bag on the track were made it was found that it could not be distinguished clearly until it reached the second bend).

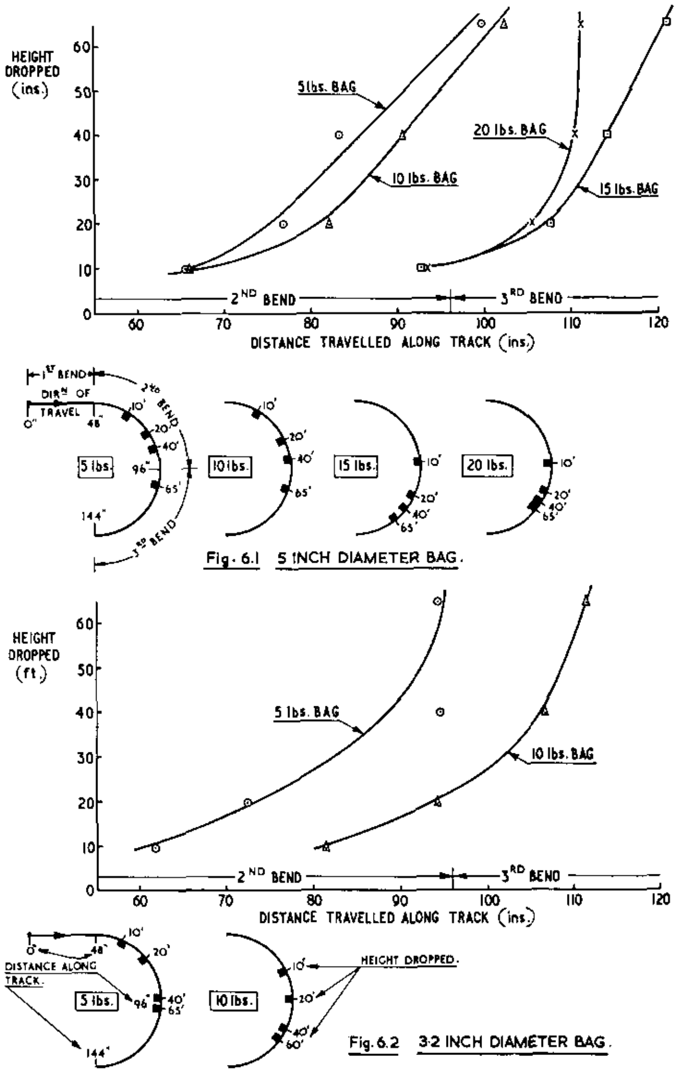

Fig. 6. Track No. 1 (Four 30-inch Radius Bends) showing distance travelled along the track by two sizes of bags dropped from several heights.

In this case, due no doubt to the slower and smoother initial deceleration together with the shorter horizontal bends, the bags reached close to the end of the third bend in some cases.

5. General Conclusions and Design Recommendations

Generally speaking, the test results show that this type of deceleration track will work with any reasonable configuration and radius of bends or troughs. The initial bend is clearly the most critical, both as regards its effect on the deceleration process and from the structural point of view. Increases in bag weight and height dropped do

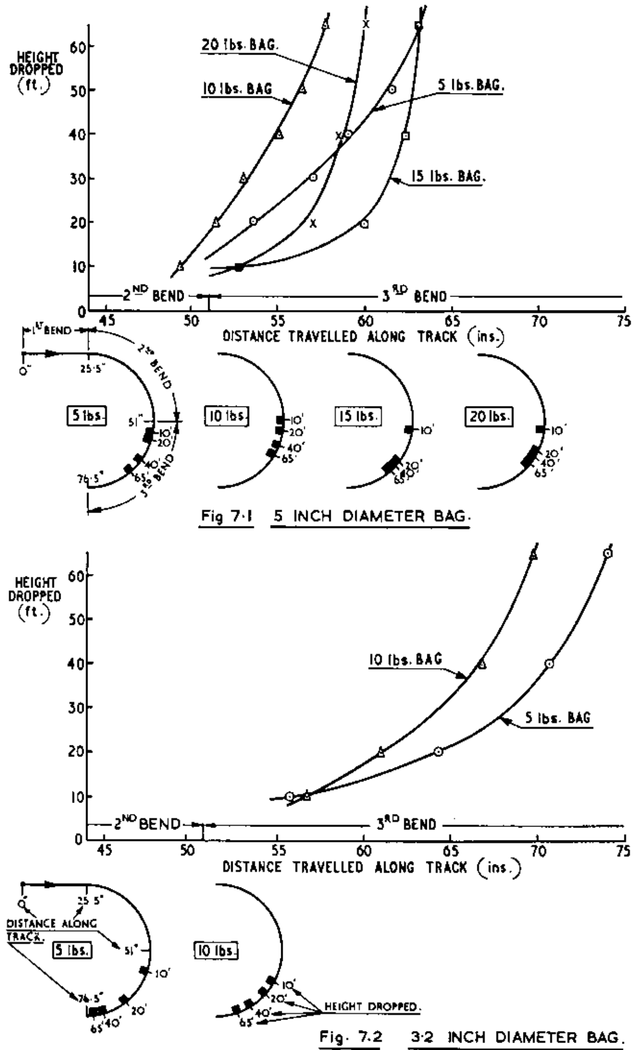

Fig. 7. Track No. 2 (Four 15-inch Radius Bends) showing distance travelled along the track by two sizes of bags dropped from several heights.

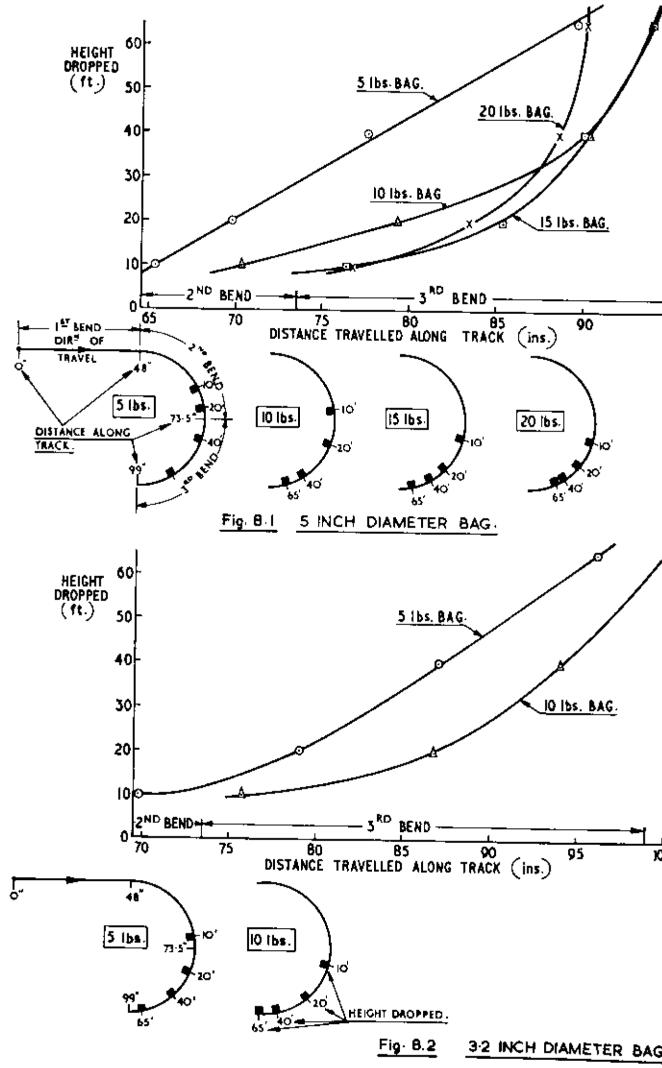

Fig. 8. Track No. 3 (1st Bend 30-inch Radius, rest 15-inch Radius) showing distance travelled along track by two sizes of bags dropped from several heights

not produce a corresponding increase in distance travelled along the track, and in some cases even reduce it. However, a small bag will travel further than a large bag of the same weight.

From a theoretical point of view it is extremely difficult to formulate a simple law connecting these model tests with full scale effects, since there are so many interacting influences on the performance of this type of deceleration track. Fortunately for the designer, the results and phenomena found during these tests are such that it should be possible to construct a full scale deceleration track with a good degree of confidence. Indeed, the bag weights tested here (although lighter than in some existing installations) probably represent a good range of full scale weights, and of course the model to full scale ratio is only about 1 to 4 for chute diameter and bag size.

The initial bend, where the bag is deflected from the vertical direction of travel to the horizontal, is clearly the most critical. It is fairly evident that it must be of as large a radius as possible where the bags are dropping from considerable heights. Fortunately, floor to ceiling heights in new buildings will normally be such as to allow bends of radius up to 6 or 7 feet with comparative ease, and still leave a clearance of 2 or 3 feet for the bag to fall from the track onto the floor. Since this bend takes the initial impact of the bag and also appears to do the brunt of the deceleration it must be well supported. Although this was not stated specifically in the Swedish installation mentioned previously, it is clear from Fig. 1 that the initial part of the track was firmly supported. One additional point regarding this first bend is that it should be fitted with a safety guard covering its upper part.

It is also evident from the test results that this design is fairly flexible. In the extreme case, all the bends could be of different radii with little influence on the performance of the track. In addition, the bends could be connected by short straight lengths of track should it be required, for example, to keep the track close to the walls of the room. Ideally, of course, room and track should be designed to match one another, but for existing hospitals, where a chute is being added, this is not normally possible. It is doubtful if a fourth bend is necessary though it will be good practice to fit a plate or cap at the end of the track. Of course, if it was found that bags were impacting on the end plate, it would be a very simple matter to extend the chute by the appropriate distance either with a short straight length or an upturned bend.

To summarise, the advantages of the deceleration track are as follows:

(*a*) Its use should obviate the danger of damage to bags of materials, thus incidentally overcoming one of the main objections to using a single chute for both linen and refuse. Cramfelt's work[2] has shown this beyond any reasonable doubt. Since no complaint was made of abrasion of the bags at existing installations in this country which had 90° bends, and since this initial bend takes the main impact and abrasion, it was felt that additional tests of this were not required.

(*b*) So far as personnel safety is concerned, provided the precaution of fitting a guard over the top of the initial bend is taken, there should be minimal danger to porters working in the room. This set-up represents a vast improvement over most existing situations and obviates the necessity to fit warning devices.

(*c*) The design itself is fairly simple and compact, inherently foolproof due to its fortunate characteristics, and very flexible to modifications.

(*d*) It has the advantage that bags of material from different floors and of different weights will tend to be distributed over the floor of the exit room, and not all drop on to the same spot. Not only will this help in preventing damage to the bags, it will also assist in avoiding the situation where they might pile back up the chute if allowed to remain uncollected.

Acknowledgements

Thanks must be recorded to the House Committee of the Western Infirmary, Glasgow, for granting us permission to erect the model chute on one of their fire-escape stairways and to Mr. Colin Thompson who assisted with much of the experimental work.

Thanks are also due to the Western Regional Hospital Board, Scotland, who sponsored the project of which this report is part.

Opinions expressed are not necessarily those of the Board or of the University of Glasgow.

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1. BAIRD, G., The Design of Hospital Disposal Chutes—a survey of existing installations, *B.S.R.U. Report* No. 82, January, 1968.

2. CRAMFELT, G., Chute for Laundry and Hospital Waste, *Sjukhuset, Göteberg*, **40** (5), pp. 115, May, 1963.

FIRST BRITISH CROSSBAR P.A.X.

A 25-LINE CROSSBAR private automatic exchange which fits unobtrusively into even the smallest office has been developed by Winster Electronics Ltd. of Ilkeston, Derbyshire. The equipment, the first of its type from a British manufacturer, is virtually silent in operation, simple to install and capable of employing mixed push button and conventional telephones of all approved types.

Ease of maintenance is a feature of the exchange, replaceable plug-in components of a limited range and long guaranteed life being used in association with non-critical circuitry of great simplicity.

Most of the circuits are mounted on "jack-in" plates o standard dimensions and are automatically "busied" on withdrawal. The components and miniature dust-proofed relays within these circuits are mounted on printed boards. The crossbar switch, itself an innovation for British manufactured equipment, is on shock-proof mountings.

Where applicable, all circuits are fitted with "busying" keys which are ineffective until the equipment concerned is disengaged. No use is made of 'N' or 'U' links or of similar components which can be lost or incorrectly inserted and the design provides for only four values of relay coil and two types of springset assembly.

The Winster P.A.X. is contained in a dust-proofed slim-line cabinet with tamper-proof detachable front and rear doors and is fitted with adjustable feet and removable carrying handles.

Installation provides no problem, it is claimed, as all external cables are terminated either on a distribution box or M.D.F. and subsequently plugged in to jacks fitted in the side of the cabinet. With the exception of strapping spare lines and group-hunting no work has to be done on site.

The equipment's register carries out its normal functions as well as serving as marker and router. If dialling or signalling does not take place within three to five seconds after seizure or after sending of the first digit, the extension is "parked" on busy. The register, in common with the line selector, includes "fail-safe" circuits so that the failure of certain common functions does not lock up equipment and thus prevent a second attempt call. Only six digits are used in the numbering scheme and the register is programmed to reject any outside this range.

The power supply is an integral part of the equipment and is situated in a sealed compartment at the base of the cabinet, where the small amount of heat given off helps to keep a dry atmosphere within the enclosure. The supply caters for a main voltage variation of up to 10 per cent. with a frequency range of 50 to 60 cycles.

Selling Maintenance to Management—the Use of Proper Costing

PART 2

By M. V. JARMAN, M.A., C.Eng., M.I.C.E., M.I.Mech.E.
Works Manager, Engineering Components Ltd.

Costing Techniques

The costing system has three functions:—

1. To provide records of the running costs of a location or area (building or group of buildings or district) in order to price the service offered by the buildings or plant contained therein.

   For this all expenditures must be collected into the respective expense centres designated by location and type.

2. To provide records of the routine maintenance costs of items of plant and buildings, whether individual or in groups, depending on size and importance; in order to be able to analyse the historical costs and evaluate the efficiency of expenditure on the various items.

3. To provide a means of checking operating performance, i.e. efficient use of labour and materials.

A costing system will only give a check on operating costs. Investigation of operating performance is not a costing exercise but an exercise for all the techniques of Work Study, e.g. performance standards of labour calculated from time studies.

Many cost accountants are criticised for inaccuracies and incomplete statements upon which management action must base decision but usually it is not the failure of the accountant to appreciate the function in question so much as the lack of co-operation by the manager concerned, and the acquiescence of the manager in working to a system of recording costs known to him to be inaccurate. It is the prime duty of a cost accountant to give full assistance to all functions of an organisation in order to provide the various managers with what amount to probably the most important tool of management, but in return the manager must offer his co-operation and provide full, honestly recorded bookings.

The results thrown up by the costing system are then used for two purposes:

Inter-comparison of like locations or items whether within or between organisations;

Investigation of costs of the locations or items themselves.

The former purpose does not often achieve a satisfactory result due to non-uniformity of cost recording between organisations or even within organisations, as referred to later.

The latter forms a real basis for detailed investigation and the foundation for cost evaluation of the maintenance policy.

No costing system can, however, be effective without a proper cost coding system.

Cost Coding Systems

Two examples of cost coding systems are given in Appendices I and II; one used by my previous company as an example of private industry and one used by the Bournemouth Corporation as an example of a public authority.

I hope that concrete examples of good operating systems will do much to fortify the argument in their favour and wish to acknowledge the co-operation of Pressed Steel Fisher Ltd. and the Bournemouth Corporation in this respect.

In an administration where only a simple system is required, the basic essentials are still the same and can be extracted easily from a study of these examples to provide a reasonable method of cost collation and control.

The Pressed Steel Fisher system is set out in some detail in Appendix I but a major development of this system is worth mentioning at this point.

In the Pressed Steel Fisher coding system the first six digits of the present nine digit coding are allocated as explained in Appendix I, leaving only the last three digits available for detailed maintenance costing; these are insufficient, however, with 25,000 machines in the factory and bearing in mind the complexity of a building maintenance classification system.

To overcome this lack of digits there are two courses of action available:

(a) To superimpose a second cost collecting system for recording costs against items of plant or building maintenance; by not only recording the nine digits referred to above, but also recording a separate six digit number on the labour and material booking sheets which would require separate processing either manually or through the computer.

(b) To extend the coding system by adding more digits and this is what the company is now doing, but not for this particular reason.

The extra digits are being added in fact to take account of the company's decision to bring in flexible budgeting which may be described as "the up-dating of cost budgets by adjusting them to actual demands, whether of service or production".

The new code in fact will have six digits for the account code, three for the cost centre and six or nine digits to replace the previous last three digits. This will mean one code number of 15 or 18 digits and serious consideration will have to be given to the method of physical booking by the operator or stores clerk, referred to later in the paper.

Whichever course of action is decided upon one thing is certain—more digits are required for maintenance classification and recording.

Such a classification has not yet been developed at Pressed Steel Fisher, but a classification system could be used such as that illustrated by Mr. M. F. Chaplin of the Ministry of Public Building and Works in a previous paper, and set out in Appendix III.

I would like to add here a quotation from that paper:

"An essential requirement of any recording system is to obtain reliability in the results. This is conditioned by the ease with which data falls into a recognizable and logical pattern within the classification. Thus a system of recording, which collects its information from sources closely responsible for the upkeep of buildings, must reflect the natural divisions occurring in maintenance work, but at the same time it should attempt to indicate a part of a building or estate attracting expenditure. For this type of work an ideal solution is for the recording system to be an extension of the normal accounting or costing procedures and for the information to be collected as a by-product of these processes."

The cost coding system for building maintenance now being used by the Bournemouth Corporation is set out in Appendix II. This system follows the proposals laid down in the "Report of Working Party on the Costing of Management and Maintenanceof Local Authority Housing", and recommended by the Institute of Municipal Treasurers and Accountants in their circular of July, 1965. It also generally follows the pattern illustrated in Appendix III (Mr. M. F. Chaplin, 1965.)

Lack of familiarity with the working of Local Authorities prevents me from commenting in detail on the problems of their costing systems, though presumably they are similar in principle to the problems arising at Pressed Steel Fisher.

It would, however, be a serious omission from this paper if an example of public authority cost coding were not given, and it seems only appropriate that it should be one that follows the proposals and recommendations referred to above.

It is very encouraging to hear of a public authority that has changed its coding system accordingly, despite the arduous effort that this must have entailed, for only through such changes can progress be made nationally in standardising cost coding systems and enabling comparative analyses to be made between similar costs incurred by like authorities.

Stores Costing

Although relatively simple to book labour hours which can be easily costed against specific jobs, it is in the booking of materials that the greatest difficulty lies for adequate cost collection.

For materials to be costed against specific jobs, stores items must be costed against a coded system, i.e. when a stores item is used the cost of that item must be immediately known and recorded against the job.

Many organisations are in fact unable to do this, but it is a pre-requisite for any costing system of a sophisticated nature that materials shall be costed and coded for instantaneous feedback and recording against the cost of maintaining an item. Without this, historical costs either do not exist or give rise to serious doubts as to their validity.

It is very often a considerable task for the organisation concerned and may, as in the case of my previous company, take years to complete.

The item costs will also need to be continuously up-dated, even if only annually, but inaccuracies in the costs or values to a limited extent can be tolerated, and there need be no undue concern about any out-of-balance in an internal audit between actual stock costs as invoiced and total value of used stocks calculated from item cost records.

It would be unfortunate if the very brevity of this section belittled the importance of stores costing for there can be no doubt that without it there can be no final and detailed analysis of maintenance costs, and all the work of cost coding and cost collection will be seriously impaired, if not rendered useless.

Analysis of Costs

For assessing the economy of utilisation of assets and the need for replacements or renewals.

What should be done with the mass of detailed costs that could be thrown up against all the individual items of plant or buildings and would run into many thousands of figures?

It may be necessary to scan these costs in toto once a year, but it is essential to devise a system of regular highlighting of only those costs which need attention, e.g. excessively high costs of maintenance of an old roof or machine; this is in fact management by exception.

"How does one know when the costs are excessively high?"

The leading question of "What should maintenance cost?" requires development of a method to evaluate not only what items should cost to maintain, but at what point they should be replaced or renewed, i.e. at what point are these items no longer economic to maintain.

The running costs of a particular item are depreciation, cost of fuel, maintenance costs of repairs and renovation, cost of downtime to production or lost services.

Using these costs and discounted cash flow analysis it is possible to calculate the point at which these costs equal the cost of replacement.

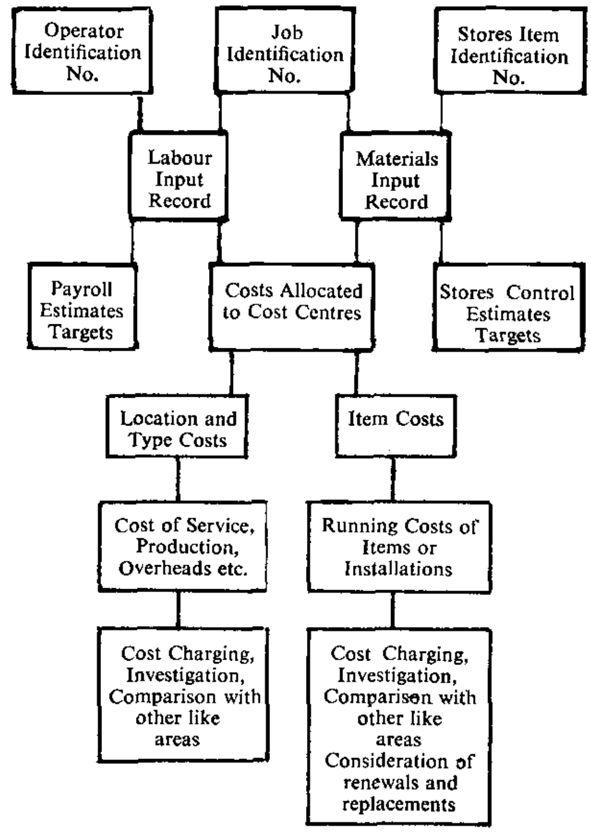
It is not a difficult exercise, but time consuming nevertheless.

Once these norms have been established one has the answer to at least some of the problems of "What should maintenance costs not exceed?" for any particular item, and only those items costing more than the norms need be thrown up for immediate investigation; with a computer this can all the more easily be done.

Consistent excess of these norms would substantiate a case for replacement—backed by the planned maintenance schedules and records kept for the item in question which could form a written confirmation of the cost analysis. This "management by exception" would enable the case for many important maintenance problems to be substantiated at an early stage.

This is, of course, not the whole answer to the cost of maintaining a particular item for there is always the consideration of efficiency, of utilisation of labour and materials and the development, for example, of more sophisticated machinery which would merit replacement of an obsolete machine.

There is also the question of analysing costs against the multitude of small routine items, but this is a subject once again for planned maintenance.



The above procedure or information flow pattern can, and indeed should be, applied in any organisation with or without computers—computerisation simply makes it easier to obtain clarity, accuracy, up-dating and collating of information.

Systems Design and Data Transmission by Computer

I think it worthwhile to make brief mention in the paper of the technique of systems design and its subsequent computer application; the results of which can be used to tighten up administration and control systems and provide accurate, up-to-date and summarised information on aspects essential to efficient management. And it is, as stated before, the very reflection of management efficiency in the maintenance organisation that will provide one of the strongest corner stones in the selling of maintenance.

There may be some readers who are not familiar with this terminology, but suffice to say in a few words that systems design covers the "detailed analysis of information flow and management control systems for an organisation".

From this, new methods and procedures are evolved which ensure brevity and clarity and completeness of transmission of information in all relevant directions.

The final sophistication is to computerise the means of transmission, storage, sorting, calculation and representation in a format required for management control. This requires provision of "input" of information in specified form and provides in return a presentation of required information, or "output" for the manager or user of the information.

For maintenance in larger authorities where any sizeable computer is available, the uses of this field of application are invaluable, providing an ideal opportunity to radically improve the main features of a cost control system—

proper booking of labour and materials

collating these costs from known costing centres

providing means of analysis and control.

At the booking stage, the ultimate objective, which is in sight already in some areas of industry, is to eliminate hand completed job and materials cards and mechanise the insertion of information into the recording areas right from the start. This briefly would operate as follows:

Labour—The operator places two identification cards into the booking-in or input station similar to a time clock, one permanent pre-punched personnel identification card and one punched job identification card; thus providing the information of hours booked against each job and at the same time recording the hours worked by that operator for payment (including incentive) purposes.

Material—The storekeeper similarly places two identification cards into the booking-in or input station, one card for the material identification and one card for the job identification; thus providing information of materials booked against each job and at the same time recording material usage for stock control.

As an example of systems design and the final sophistication of booking procedure, and indeed the illustration of a cost recording pattern, the diagram on page 274 shows how the information progresses from input to output.

Introduction of Proper Costing

Finally, I have set down the chronological pattern that could be followed when attempting to introduce proper costing.

Stage I: Cost totals only are known with any accuracy. Breakdown of costs insufficient and inaccurate.

Stage II: Implement a coding system for all known locations and types of cost.

Stage III: Design a classification system for maintenance costs and implement a coding system to cover this, added to the coding referred to in Stage II.

Stage IV: Improve the booking system for labour and materials.

(a) Labour—booking to codes referred to above in II and III.

(b) Materials—install a proper stores costing and coding system which will enable costs of materials to be registered immediately after use against a booked code no. (i.e. against location, type and item).

Stage V: Collate costs of labour and material into totals against individual items, and summarised under location and type; using computers if possible.

Stage VI: Compare costs against estimates. Compare costs of direct work and contract work. Investigate costs against items—historical: labour and materials—efficiency.

Stage VII: Set targets and introduce incentive payment schemes.

Stage VIII: Control general trend of costs by:

1. Comparison with previous costs, per location, type and item
2. Comparison with estimates
3. Comparing service offered and noting costs of non-maintenance or inefficient maintenance
4. Forecasting future trends
5. Comparisons with other like costs internally and with other authorities.

Conclusion

The introduction of proper costing can be a long and arduous task for both maintenance manager and accountant but is one that must be undertaken, along with maintenance planning and analysis, if a high level of management is to be achieved, and a coherent policy for maintenance is to be adopted.

APPENDIX I

EXAMPLE OF COST CODING SYSTEM IN USE AT PRESSED STEEL FISHER LTD.

Table I lists the Type of Expenditure, denoted by Account Codes, and Table II lists the Location of Expenditure, denoted by Cost Centres.

The Company uses a computer for data processing and all labour and material costs are booked against a nine digit code. The first three digits identify the account code; the second three digits identify the cost centre; the third three digits being used for identification of individual expenditures as explained later.

Two additional aids are used; firstly, special "accommodation cost centres" which are used for integrating various groups of cost centre costs and presenting them in a simplified or abbreviated form for ease of presentation for budgetary control; secondly, special "accommodation account codes" for re-allocating overhead costs to the various production or building locations.

Table III shows a chart indicating the overall pattern of expenditure in the department and the labelling of the various costs by account code and cost centre; it will be seen that the expenditure falls into three categories:—

1. Increased assets by capital expenditure on new buildings, expansion schemes and additional new plant; (i.e. non-replacement). (Account Code Number 197 during construction, transferred to 192, 193 on completion.)
2. (a) Maintenance of buildings (Accommodation Cost Centres 810, 860)

   (b) Maintenance of plant (Accommodation Cost Centres 812, 862)

   (c) Power, Heat and Light, etc. (Cost Centres 731–761)
3. Improvements to property (and in the case of industry, the installation of production equipment). This expenditure, like maintenance, is "written off". (Account Code Numbers 609, 629)

From detailed costing and planning, budgets for these three categories are compiled and submitted to higher management.

The Detailed Costing of Maintenance

The cost accountant neatly assembles all the costs of maintenance into a small number of totals by means of his techniques, i.e. through the cost centre or accommodation cost centre codes, as shown on the chart in Table III, viz.,

Administration (14 cost centres for office staff and the various trades' overheads, i.e. supervision, stationery, etc.)	
Electricity, Steam, Gas, etc.	(10 cost centres)
Maintenance of Buildings, Plant etc.	(5 cost centres)
Improvement to Buildings	(2 cost centres)

Now obviously it is essential that none of the costs shown are duplicated, otherwise a false total would emerge, and so the costs collected on the chart under Power, Heat and Light etc. exclude the cost of maintenance on buildings (e.g. sub-stations, boiler house) and plant (e.g. switchgear, boilers) necessary to provide these services; these costs being already included elsewhere under their respective maintenance cost headings for buildings and plant. If their costs were included under the Power, Heat and Light costs, then the costs shown in the building and plant costs would be incomplete. A matter of choice, but the method adopted appears to be the more advantageous.

However, we do wish to know the total costs for the provision of ancillary services to buildings and the cost accountant provides us with yet another, but most important device known as "reallocated overheads." This is simply a method of transferring costs from one cost area to another for internal costing and cost control purposes.

In Table IV the chart shows how the re-allocated costs enable the total costs of ancillary services to be evaluated.

Under steam costs it will be noted that the cost of maintaining the plant is a straight transfer of costs included under 602 (or 622)/741 (plant in the boiler house) but for maintenance of the boiler house building, a new animal has appeared—the accommodation account code, and this must be explained.

Under plant maintenance each item of machinery is located by its cost centre, but under building maintenance the cost centres are occupied by a further limited breakdown of building costs.

It had been decided, for production costing purposes, to allocate the maintenance cost of a machine directly to its production or service area but to add the building maintenance costs together and distribute or re-allocate their costs over the factory on a cost per area basis: e.g. the costs collected under 601, 621 (building maintenance) would be transferred to account code 792, divided by the square foot area of the factory and re-allocated in proportion to the area of each building (e.g. boiler house).

The other accommodation account codes are used for similar purposes.

Heating and lighting costs are re-allocated simply on a square footage basis, but power, steam and compressed air etc. are re-allocated on a metered or estimated consumption for each area of the factory. The electricity costs, for instance, under cost centre 731 are, in fact, split down into lighting, power and compressed air (provided by electrically driven compressors) for re-allocation through the accommodation account codes.

Whence, in brief, every production or service unit is fully costed by adding to its direct charges the re-allocated costs of what would virtually be akin to a rent charge on that unit.

Details of these re-allocated costs are supplied to all unit managers to show them the total cost of running that unit even though they do not control the budget for these particular items.

For maintenance costs of individual items only the last three digits were available, but unfortunately with 25,000 machines in the factory and bearing in mind the complexity of building maintenance, three digits were insufficient and they could only be used to identify large expenditures individually, or small expenditures collectively under 000, i.e. there were no directly costed records against items of plants or buildings and a separate system was being developed to provide these, as explained in the main text of the report.

TABLE I
TYPES OF EXPENDITURE—ACCOUNT CODES

Assets

100–199

For example:

192 Buildings (completed)
193 Plant and Equipment (installed)
197 Buildings and Plant under Construction or Installation

Liabilities and Capital

200–299

Reserves, Provisions, etc.

300–399

Sales

400–499

Expenses—General

500–599

For example:

512 Rates
523 Insurance
574 Consultants' Fees
599 Sundries

Expenses—Departmental

600–699 *Routine and Minor Maintenance (Jobs under £100)*

For example:

601 Land, Roads, Buildings
602 Plant and Machinery
603 Vehicles
604 Furniture, fittings
609 Production Lay-outs and Improvements

Power, Heat and Light

611 Fuel Oil
612 Coal, Coke
613 Electricity
614 Gas
615 Water
616 Oxygen
617 Acetylene

Major Maintenance Projects (Jobs over £100)

612 Land, Roads, Buildings
622 Plant and Machinery
624 Furniture, fittings
627 Minor Equipment write-offs
629 Production Lay-outs and Improvements

Employee Benefits

630–639

Travelling etc.

640–645

Depreciation

661–666

Advertising

671–689

Material Expenses (Gloves, Stationery, etc.)

691–699

Indirect Costs—Labour

700–790

Accommodation Account Codes (to cover the following items)

790–799

For example:

791 Employee Benefits
792 Building Costs (Based on area occupied)
793 Space, Heating and Lighting (Based on area occupied)
795 Power for Major Processes (Based on return from the Works Engineer)
796 Steam for Major Processes (Based on return from the Works Engineer)
797 Fuel Oil for Major Processes (Based on return from the Works Engineer)
798 Gas for Major Processes (Based on return from the Works Engineer)
799 Compressed Air for Major Processes (Based on return from the Works Engineer)

TABLE II
LOCATION OF EXPENDITURE—COST CENTRE CODES

Production Departments

100–199

Production Service Departments (Traffic, Laboratory etc.)

200–299

Stores

300–399

Works Engineering Department

400–414

For example:

400 Administration
401 General Millwrights
402 Press Millwrights
403 Electricians
405 Building Trades
406 Heavy Gang
407 Tinsmiths
409 Road Gang
410 Plant Examiners
414 Pipe Fitters

Other Departments

420–499

General Administration—Cowley Plant (Personnel, Welfare, etc.)

500–599

General Administration—Group Departments (Sales, Accounts, etc.)

600–699

General Services

700 799

For example:

700 General
701 Maintenance of Factory Roofs
702 Maintenance of Factory Fabric
703 Maintenance of Factory Floors
704 Maintenance of Factory Painting
705 Maintenance of Factory Doors
706 Maintenance of Office Roofs
707 Maintenance of Office Fabric
708 Maintenance of Office Floors
709 Maintenance of Office Painting
711 Maintenance of Roads, Yards
712 Maintenance of Fences, Gates
715 Maintenance of Drainage
737 Maintenance of all Lighting
741 Steam Production Costs (Main Boilers)
742 Steam Distribution
744 Fuel for Direct Space Heaters
745 Space Heaters
747 Air Conditioning and Ventilation
751 Paint Shop Oven Fuel Costs
754 Gas Production Costs
755 Gas Distribution
761 Water Costs
762 Water Distribution
764 Air Compressors
716 Maintenance of Trade Waste
731 Electrical Production Costs
732 Maintenance of H. T. Distribution
734 Maintenance of Bicycle Distribution
765 Air Distribution
767 Welding Water Systems
768 Lifting Tackle
769 Oiling of Equipment other than Presses
789 Equipment in Storage

Accommodation Cost Centres

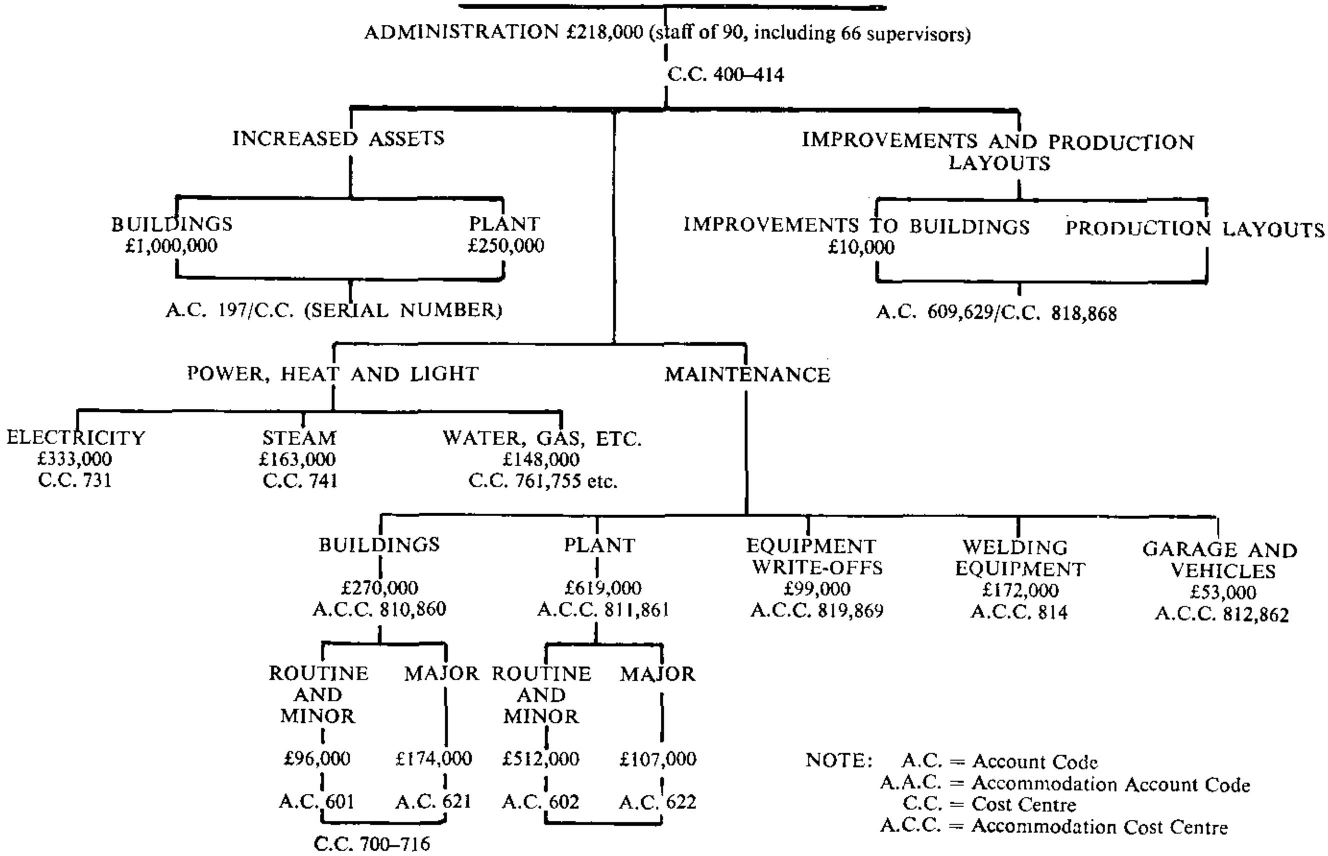
500–899

For example:

COWLEY	GROUP	
810	860	Building Maintenance
811	861	Plant and Equipment Maintenance
812	862	Vehicle Maintenance
814		Welding Maintenance
818	868	Production Lay-outs and Improvements
819	869	Equipment write-offs

TABLE III

ENGINEERING SERVICES—1966 BUDGET



NOTE: A.C. = Account Code
A.A.C. = Accommodation Account Code
C.C. = Cost Centre
A.C.C. = Accommodation Cost Centre

TABLE—IV RE-ALLOCATED COSTS FOR ANCILLARY SERVICES

1. STEAM—Cost Centre 741

Account Codes allocated for normal costing		Re-allocated overhead costs for complete costing	
Labour	*Materials etc.*	*Labour*	*Materials etc.*
749	574	602	602
779	599	622	622
782	611	627	627
785	692		662
	693		791
	696		792
	698		795

2. **ELECTRICITY**—Cost Centre 731

Account codes allocated for normal costing

Labour	*Materials etc.*
749	613
779	699

Re-allocated overhead costs for complete costing

Labour	*Materials etc.*
602	602
609	609
	627

3. **COMPRESSED AIR**—Cost Centre 764

Account codes allocated for normal costing—NIL

Re-allocated overhead costs for complete costing

Labour	*Materials etc.*
602	602
627	627
629	795

NOTE: The sum of allocated and re-allocated costs give the total cost of the service, and in any survey of costs and possible economies in such services it is essential that the total costs are considered.

APPENDIX II

EXAMPLE OF COST CODING SYSTEM IN USE AT COUNTY BOROUGH OF BOURNEMOUTH

Table V lists the types of expenditure for Housing Repairs, denoted by Expenditure Heads.

The system was devised to meet the recommendations laid down in the "Report of Working Party on the Costing of Management and Maintenance of Local Authority Housing" (1964), and includes codes which indicate the period of construction, height of buildings, and maintenance classification.

This system of cost coding differed from the Borough's normal method of costing in that expenditure is coded direct to the cost head (or cost centre) rather than to a job number.

In the Borough's normal costing system, which is computerised, seven digits are used for cost codes of which four are generally the job number, leaving three digits for sub-division or further reference.

A full review of the accounting system is shortly to be carried out, however, to develop a fully flexible system of costing and transfer or conversion of costs from one area to another, e.g. job no. to expenditure code.

The new system will also enable certain manually completed costing records to be transferred onto the computer.

TABLE V

HOUSING AND ESTATES COMMITTEE

Housing Revenue Account (Continued)

Housing Repairs Fund
Expenditure Head

Code Main	Sub.	Detail	
			External Decorating
83	I X	110	Walls—cement rendered on Tyrolean
		120	Windows, doors, gutters, pipes, roofs
			Internal Decorating
		210	Programmed walls, ceilings and paintwork
		230	Non-programmed work, including voids
			Structure
		310	Walls, foundations, chimney stacks
		320	Roofs
		330	Rainwater wastes
		340	Floors, staircases, skirtings
			Structural Finishings and Fixings
		400	Replacement of metal casement windows
		410	Doors and windows
		420	Glazing
		430	Plastering and wall tiling
		440	Joinery fixtures and sundries
		450	Fireplaces and tiled surrounds
			Water and Sanitary Services
		510	Water supply
		520	Sanitary fittings
		530	Soil wastes
			Other Domestic Services and Appliances
		610	Electric wiring, points and pendants
		620	Gas piping and points
		640	Gas—central heating
		650	Electricity —under floor heating
		690	Washboilers
			External (site) Works
		710	Drains and external services
		720	Paths and paved areas
		730	Fences, boundary walls, gates, clothes posts
		740	Retaining walls and other works
			Ancillary and Miscellaneous
		840	Refuse disposal
		870	Disinfestation
		880	Other items
			Other Buildings
		940	Shops
		950	Other items
83	40	910	*Temporary Bungalows*
83	40	920	*Acquired Dwellings*

I Period	**X Storey Height**
1. Built before 1945	1. 1 and 2 storeys
2. Built 1945 to 1964	2. 3 and 4 storeys
3. Built after 1964	3. 5 and more storeys

APPENDIX III

The following extract from a paper presented in March, 1965 at the A.R.I.B.A. conference by Mr. M. F. Chaplin, A.R.I.C.S., Ministry of Public Building and Works, sets out a suggested hierarchical system of classification of maintenance work.

"If it is wished to record information in limited detail, as would normally be the case, the use of standard classification based on a series of primary headings would suffice, each identified by a single digit."

"Where it is desired to obtain information in greater detail, the primary groups can be expanded with secondary headings."

"The arrangement is useful not only in defining the content of the secondary grouping, but also, by using four identifying digits, as a means for more critical investigations still within the framework of the overall system."

CLASSIFICATION OF MAINTENANCE OPERATIONS AND REPAIRS

Primary Group	**Secondary Group**
1. External Decoration	
2. Internal Decoration	
3. Main Structure	31 Foundations and Basements
	32 Frame
	33 External Walls, Chimneys and Flues (excluding Boiler Flues)
	34 External Windows and Doors including Glazing
	35 Roof Structure
	36 Roof Coverings

	37 Roof Lights and Glazing 38 Gutters and Rainwater Pipes
4. INTERNAL CONSTRUCTION	41 Ground Floors (where not part of Foundation Slab) 42 Upper Floors 43 Staircases and Steps 44 Internal Walls and Partitions 45 Doors and Screens including Glazing
5. FINISHES AND FITTINGS	51 Ceiling Finishes 52 Wall Finishes 53 Floor Finishes 54 Shelves, built-in Furniture and miscellaneous Joinery 55 Ironmongery 56 Cloakroom and similar miscellaneous Fittings
6. PLUMBING AND SANITARY SERVICES	61 Cold Water Service Pipes, Storage Tanks, Cisterns and Valves 62 Hot Water Service Pipes, Storage Tanks and Cylinders, Domestic Boilers, Valves and Insulation 63 Sanitary Fittings including Taps and Traps 64 Waste, Soil and Vent Pipes
7. MECHANICAL SERVICES INCLUDING HEATING AND VENTILATION AND GAS INSTALLATIONS	71 Boilers, Firing, Instrumentation and Automatic Controls, Flues 72 Steam and Hot Water Distribution including Heat Exchangers and Heating Appliances 73 Workshop Equipment, Lifting Appliances and Special Industrial Equipment 74 External Water Supply, Treatment and Storage Plant 75 Lifts 76 Air Conditioning, Ventilation and Refrigeration 77 General Utilities 78 Gas Installations and Equipment (except Kitchen Equipment)
8. ELECTRICAL SERVICES AND KITCHEN EQUIPMENT (all types)	81 Electrical Generation and Prime Movers 82 Electrical Transmission and Distribution 83 Electrical Installations (Wiring Switch and Control Gear) 84 Electrical Appliances and Fittings (except Kitchen Equipment) 85 External Lighting and Airfield Lighting 86 Lightning Protection, ELV Systems and Equipment 87 Kitchen Equipment
9. EXTERNAL AND CIVIL ENGINEERING WORKS	91 Roads, Car Parks, Parade Grounds, Hardstandings and Runways 92 Paths, Playgrounds and general Paved Areas 93 Fences, Gates and Boundary Walls 94 Drains and Ditches 95 Sewage Disposal 96 Water Storage Tanks and Reservoirs 97 Railway Tracks, Platform Docks, Wharves and Jetties, Sea Defence Walls 98 Horticultural and Arboricultural Works 99 Miscellaneous External Works
10. MISCELLANEOUS AND ANCILLARY WORKS	01 Adaptations and Minor New Works 02 Replacement of Fire Damage 03 Routine Cleaning

The following table illustrates the further division of the secondary groups.

Primary	*Secondary*	*Tertiary*
(6) Plumbing and Sanitary Services	(2) Hot Water and Heating Services	*Pipes* (01) Lead (02) Steel (03) Copper (04) Plastics *Valves* (11) Stop valves *Tank and Cylinders* (21) Galvanized Steel Tanks (22) Galvanized Steel Cylinders (23) Copper Cylinders

APPENDIX IV

INSTALLATION OF A NEW BOILER HOUSE AT PRESSED STEEL FISHER LTD.

This case illustrates a successful conclusion of an exercise where capital was invested to reduce running costs and yield a satisfactory return on the investment.

The project was designed to replace three existing boiler houses containing some 16 boilers with one new boiler house containing six boilers, increasing the overall efficiency of steam generation from 60% to 82%.

Every aspect of existing and proposed systems were cost analysed in considerable detail, covering overhead costs, staffing, energy lost in distribution, water treatment, blow-down losses, oil consumption, grade of oil, maintenance costs, tax allowances, and depreciation charges.

The discounted cash flow analysis was based on the first full year's operating costs for the new boiler house and allows for a very pessimistic increase in maintenance costs by £500 per annum to £10,000 per annum in the twentieth year.

Briefly, the details of costs were as follows: -

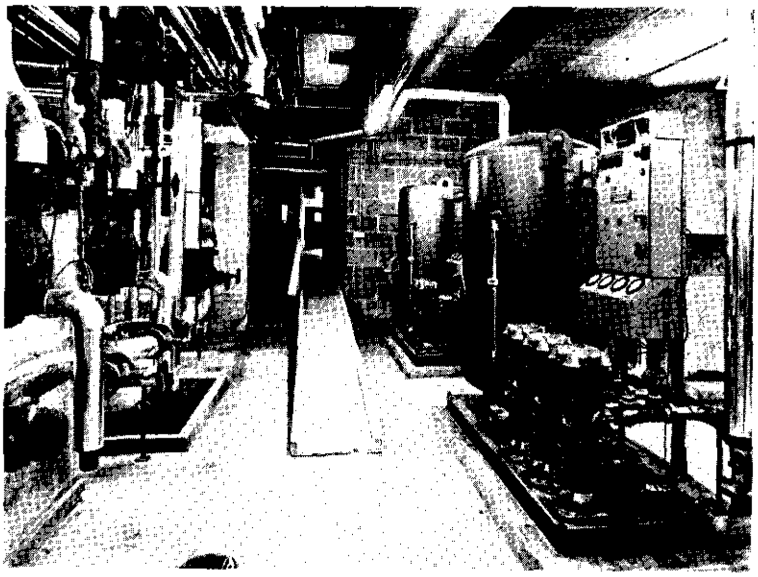
Capital Cost: £320,000 for new boiler plant, building and steam distribution system (1964)

Running Costs: Reduced from £220,000 per annum by £76,700 per annum on equivalent steam loads, the savings made up from:—

	£ p.a.
Oil	56,500
Operating Labour	6,500
Plant Maintenance and Power	12,600
Building Maintenance	1,100
Total	£76,700 p.a.

The discounted cash flow analysis indicated a net return on the investment of 15% over a 12 year life of plant, or 20% over a 20 year life of plant.

The main plant room of the new maternity block at Rush Green Hospital, Essex. To the right are two Megator Auto-Unit Booster Sets. The nearer set pumps softened water to roof storage tanks; the second set supplies the drinking water system. To the left of the picture are hot water and heating calorifiers.



BOOSTER SETS FOR HOSPITAL WATER SUPPLIES

WATER supplies for Romford's new maternity unit at Rush Green Hospital are pressurised by Auto-Unit Booster Sets manufactured by Megator Pumps and Compressors Ltd.

The new maternity unit

The construction of the new maternity unit at Rush Green Hospital constituted an experiment in system building. Proposed by the Ministry of Health, the purpose of the experiment was to evaluate any advantages to be gained by the use of modern methods of system building, and by bringing in the contractor at an early stage of planning.

The new building consists of a five-storey slab block with a ground-floor podium. A logical layout, based on the sequence of movements of patients, has been adopted. Examination rooms, labour wards, operating theatres and a special baby-care unit are situated on the ground floor; the upper floors are devoted mainly to lying-in and ante-natal beds. In all, 104 beds are provided.

In the basement are situated the main plant room, electrical switch room and the air conditioning plant room. The main plant room houses hot-water and heating calorifiers and the Booster sets for the water supplies.

Auto-Unit Booster Sets

Wherever mains pressure is inadequate for an industrial process, or where higher pressures are needed for tall buildings, Megator Auto-Unit Booster sets provide a reliable means of increasing pressure. These sets are self-contained, compact, and fully automatic in operation.

The basic equipment in each set consists of the necessary pumps and a cylindrical pressure vessel in which water pressure is maintained by compressed air. Under the control of pressure switches, the pumps draw water from a low pressure supply to keep the tank pressure within the required limits. A small compressor is normally provided to keep the tank supplied with air; it is operated by a float switch.

Two pumps are usually provided: one is for normal duty, the second being a support pump which cuts in automatically to meet peak demands. In other cases there can be three or more pumps which automatically cut in and out in a preselected order. Sets can include a manual selector to allow the duties of the various pumps to be interchanged to distribute running time evenly among the pumps. Megator booster sets can be supplied with the pressure vessel integral with the set, or as a separate item.

Rush Green water supplies

From Rush Green Hospital's own softening plant, a supply of soft water enters the main plant room of the new maternity unit and is connected directly to a 3-pump Megator Auto-Unit set. From the booster the water is then pumped to roof storage tanks, a sluice service tank, two heating system calorifier feed tanks, and fire hose reels.

The roof storage tanks supply the cold water down services and also feed the hot water supply calorifiers. The separate sluice tank serves slop hoppers, disposal units and bidets.

A supply of unsoftened water also enters the main plant room and passes to a break tank. It is then fed, by a 2-pump Auto-Unit set, to drinking water points throughout the building.

Plumbing at the new Rush Green Maternity Unit as well as the heating and ventilating services was designed and installed by Andrews-Weatherfoil Limited of Slough, Bucks.

ROYAL FREE HOSPITAL

The Express Lift Company Ltd., a subsidiary of the General Electric Company and the biggest wholly-British owned lift company in the world, will supply all the lifts for the new Royal Free Hospital, Hampstead.

Worth approximately £278,000, the order is for 29 lifts to be supplied which are: Six 23-person passenger lifts with speeds of 500 ft. per minute. Six 27-person beds/goods lifts and two 30-person beds/goods lifts, all with speeds of 300 ft. per minute form the main transport system of the 15-storey block.

Other lifts in the contract include four passenger lifts, five passenger/goods lifts, five goods lifts and one service lift.

A typical private room at the Tunbridge Wells Nuffield Nursing Home. Patients enjoy informal visiting hours, bedside telephone, radio, TV if required, and an individual two-way call nurse system.

NEW "MINI-HOSPITAL" FOR KENT

KENT'S new £192,000 "mini-hospital," the 20-bed Tunbridge Wells Nuffield Nursing Home, was officially opened last month.

The Home, in Kingswood Road, is the 14th unit in the network of modern surgical nursing homes being set up throughout the country by Nuffield Nursing Homes Trust.

The two-storey building has one twin-bedded and 18 single-bedded rooms for patients on the first floor, each with individual "call-nurse" facilities, private toilet, bedside telephone, and provision for television if required.

On the ground floor is a modern operating theatre suite, diagnostic X-ray unit, kitchen, administration offices and staff dining room.

The existing house in the grounds of the Home, formerly the residence of Lt. Col. W. D. Coles, has been converted into flats for the Matron and senior nursing staff.

The building, which was designed by the Trust's Architects, Messrs. Anderson, Forster and Wilcox, takes into account the probable need for further patient accommodation at a later date, and provision has been made for a second phase, two-storey extension to be added to the present building. The building is finished externally with High Brooms multi-golden brick. The front driveway is flanked by parking spaces for 20 cars.

The main contractor was Edor Construction Ltd., a member of the Enfield Properties Group of Tunbridge Wells. The management of the contract was subsequently transferred to an associate company, Zone Construction Ltd., who have taken over the building activities of Edor Construction in the South-East of England.

Of the total cost of £192,000, £83,000 was raised by the local community in a space of seven months, through an appeal committee headed by Lord Abergavenny.

A leading local orthopaedic surgeon, welcoming the opening of the new Home, comments:

"The new Nuffield Nursing Home has opened at a singularly opportune moment, especially as the number of patients requesting private treatment continues to rise steadily.

"Tunbridge Wells has become a centre of growing importance for medical and surgical care and caters for the population not only of the town itself, but of a large surrounding area.

"There have never been enough private beds in hospitals, and their number has been further reduced recently on orders from the Ministry of Health.

"The Nuffield Nursing Home, with its splendid operating theatre and X-ray department, is equipped to deal with practically every type of surgery and equally well with medical complaints. The only fear of the medical profession is that the 20 beds may prove insufficient to satisfy the demand, but all of us working in the area are delighted at being able to offer our private patients the very best and most up-to-date technical facilities, coupled with great personal comfort. It will be a real pleasure to work in such surroundings."

Nuffield Nursing Homes Trust was founded in 1957 by B.U.P.A., the U.K.'s largest provident association which helps more than 1½ million people meet the cost of private medical care.

N.N.H.T. is a registered charity dedicated to providing more and better nursing homes in areas where facilities for private treatment are inadequate. The late Lord Nuffield, who was President of B.U.P.A. when the Trust was formed, gave permission for his name to be used, but neither B.U.P.A. nor N.N.H.T. receive financial help from the Nuffield Foundation.

In launching the Trust, B.U.P.A. agreed to provide funds from investment income for non-profit surgical nursing homes in areas approved by the governing board of the Trust. When a new home is to be financed, the Trust makes it a condition that the major part of the money required must be raised locally. The excellent response to N.N.H.T. appeals is ample evidence of the value set on private treatment in Britain today.

The opening of the Tunbridge Wells Nursing Home means that the Trust now administers 14 homes with a total of 477 beds—well over ten per cent of the private surgical nursing home beds in Britain.

NEW CANCER DETECTION CENTRE

A NEW diagnostic centre of the Women's Cancer Detection Society came into operation at the Queen Elizabeth Hospital, Gateshead, on 10th September, only thirteen weeks after the contract was placed and only 16 days after the siteworks were commenced.

The centre, financed by public subscription organised by the Newcastle Journal, will aid early detection of breast cancer and is an extension of the Women's Cancer Detection Society founded in 1963 as a result of a generous gift by an anonymous Tyneside donor which allowed the society to develop the early detection of uteric cancer in association with the gynaecological research department of the Queen Elizabeth Hospital.

This project was initiated by the Society under the Chairmanship of its senior medical director, Mr. Stanley Way and the design of the department was drawn up by the Society's Committee advised by its senior radiologist, Mr. Peter Hacking.

To achieve speed of construction they used Portakabin instant accommodation units made in York and adapted to accept the Aga Thermovision equipment which the centre employs in the detection of early breast cancer.

The four Portakabins are equipped to serve as examination rooms, changing rooms, toilets and reception area, and are ready fitted with plumbing, electrical works and air conditioning. Needing little in the way of foundations the whole project from the commencement of the siteworks to the completion of the installation took only 16 days.

The new centre, which is adjacent to the gynaecological research department, is linked to the hospital for electrical heating and water services.

Commenting on the project Mr. Way said, "The need for early detection of breast cancer is urgent because the results of the treatment of this disease have not proved successful over the last 50 years simply because diagnosis has not been early enough. Smears which have proved so successful in other forms of cancer diagnosis cannot be obtained from the breast, but malignant tumours are hotter than the surrounding normal tissue and the Thermovision equipment we have can detect the small increases in heat. By using this technique along with electrical examination and subsequent X-ray examination in selected cases, we hope to increase the accuracy of early diagnosis. This has already been done by us at the centre. Our Society has run a Palpation clinic for two years and by this means we discovered early breast cancer in 516 cases. Using temporary premises loaned to us over the last six months by a Gateshead concern, we have increased our pick up rate to one in 255 cases."

Mr. Way added: "Since breast cancer kills more women per annum than the total road casualties in Great Britain we think that this service is important. It has been brought into being in part by the low cost and efficacy of the Portakabin type of construction. Many other hospital services are equally urgently needed and, in these days of financial stringency, building costs must be cut severely so that money available can be spent on the necessary equipment and brain power. Our society and our contractors believe we have made a small contribution to this end."

B.S.I. News

SAFETY OF MEDICAL TREATMENT LAMPS

BS 3232: *Safety requirements for medical treatment lamps*, which is now available in a revised edition, covers every aspect of the operation of those appliances, taking particular account of recent improvements in insulation techniques.

The standard specifies safety requirements for lamps intended for operation on a declared supply voltage not exceeding 250V, incorporating an ultra-violet, radiant heat, or infra-red emitter, or a combination of two or more of these. It does not apply to ultra-violet, radiant heat or infra-red baths or tunnels of the bed-cradle type, nor to radiant heat or infra-red hand held lamps. In fact, the use of hand held lamps is deprecated since, whilst having no therapeutic advantage over similar stand or wall-mounted lamps, they can introduce unnecessary hazards.

This revision makes provision for Class I, Class IIA and Class IIB lamps:

Class I. A lamp having some functionally insulated parts which can be touched and are required to be earthed.

Class IIA (all insulated). A lamp in which a durable and substantially continuous enclosure of insulating material envelopes all metal parts excepting small parts as name plates, screws or rivets, which are isolated from other metal parts by insulation at least equivalent to reinforced insulation.

Class IIB (all insulated). A lamp in which double insulation is used throughout, excepting for parts where, because double insulation is impracticable, reinforced insulation is used.

The enlarged list of definitions which is included at the beginning of this revision includes the above class descriptions and other terms related directly to insulation as well as the definitions of emitters in terms of wavelengths.

The second clause, on design and construction, gives features such as corrosion resistance, counterbalancing of the lamp housing (where this exceeds a certain weight), positive locking mechanism and safe connection to supply. Full details are given of terminals, flexible supply cords, internal connections, creepage distances and clearances, earthing (for Class I lamps), protection, operating temperature rise, electric shock protection, stability and castors.

Lamps are expected to pass the type tests, for stability, accessibility of live parts, loading, temperature of component parts, recession of emitters, mechanical strength, effectiveness of guard (if fitted) as a protection against fire hazard, chord anchorage, insulation efficiency, and earth continuity (Class I only).

The routine tests clause relates to insulation resistance.

Manufacturers of medical treatment lamps complying with BS 3232 may apply to BSI to use the Kite Mark on them. This is a registered certification mark used only on licence from BSI, and its presence on an item or package is an independent assurance that it does comply with this standard.

Copies of BS 3232: 1968 may be obtained from the BSI Sales Office at 101/113 Pentonville Road, London, N.1.

Operating Theatre Planning

REPORT OF CONFERENCE AT THE HOSPITAL CENTRE

A ONE-DAY conference took place, under the auspices of the King's Fund, on the subject of Hospital Theatre Planning, under the Chairmanship of Dr. M. H. Gleeson-White, Consultant Bacteriologist, Addenbrooke's Hospital. For the past ten years Dr. Gleeson-White has been Chairman of the project team responsible for the planning and building of the new Addenbrooke's Hospital, Stage II of which is a £10m. project now under construction.

Following the Chairman's introductory remarks, a Ministry view on the Current Problems of Theatre Planning was given by Mr. H. Goodman, Assistant Chief Architect, Department of Health and Social Security.

He said:

"We can consider theatre planning as seeming to fall under the three inter-related aspects of management, physical planning and economics. Management, included both the programme of theatre work, the control of staff discipline and the integration of the theatre with all its supporting medical and industrial services. Physical planning included the actual relationship of the theatre within the hospital, the juxtaposition of the various spaces and the problems of environmental control. Economics included not only the capital and running costs of the theatres themselves but the efficiency of the staff and the throughput of the theatres.

"It would seem that the major problem facing us is caused by the changing role of the theatre and that it currently seems to be apparently more subject to change than any other part of the hospital. We had to consider the location of theatres in relationship to the whole hospital and the degree of centralisation that we could accept. (Centralisation could mean fewer but more efficient theatres.) Their cost in relationship to their life and potential obsolescence, whether theatres themselves were fixed and finite or whether they should be far more flexible and disposable items in themselves. Whether theatres were disappearing as entities within the hospital and merging into a diagnostic/therapeutic core of the hospital, their reliance on the merging disciplines of thermography, sonics, etc. etc. and whether we could accommodate the potential growth of theatre use due to increases in spare part and transplantation surgery. This growth potential must give us cause for concern, particularly in regard to their preferred central location and, finally, in common with many other hospital departments, they relied more and more on outside sources for the control of their environment, the constancy and sterility of their supplies and the precise management of their daily routine.

"It would appear that the range of planning solutions open to us was as wide as the problems posed. We could plan compact efficient theatres in the centre of the hospital surrounded by their supporting services, with limited space for expansion and relying on increasing management efficiency to increase the throughput of the theatres. (At present theatre output is increased by working existing staff longer hours rather than a second 'twilight' shift).

We could plan theatres equally efficiently, but less well sited, on the perimeter of the hospital, giving space for expansion in the traditional way. Or we could plan, and this was pure hypothesis, vast undifferentiated barn-like structures, with complete service grids above and below, capable of accepting knock-down, throw-away flexible theatres as part of this diagnostic/therapeutic core.

"All the potential approaches to theatre planning must be considered in the context of increasing standardisation in hospital planning as a whole. If we were to take advantage of industrialisation (in buildings, engineering and equipment) to build hospitals more quickly and more cheaply, then an increasing measure of standardisation is essential. Will standardisation encourage or inhibit advances in theatre planning? I would suggest that, subject to one caveat, standardisation is the only way by which theatre planning can keep pace with changes in management and medicine. This caveat is that a constant, on-going, programme of research into all aspects of theatre planning is instigated centrally, supported nationally and started now."

Dr. P. J. H. Clarke, of the South West Metropoiltan R.H.B., spoke next and referred to the four-theatre form of theatre construction at St. Peters Hospital, Chertsey. It was a good scheme about which there was no mystique and was one that should be generally applicable. A theatre had an expected life of some sixty years.

Savings would be derived from standardisation, but it must be remembered that successful design required a team effort.

Mr. R. A. H. Ruth, commenting as an architect, said that a major handicap was limited finance.

Mr. J. West, Assistant Regional Engineer with the S.W. Metropolitan Board, dwelt on the theme of increasing pressurisation and then on zoning schemes. Pressurisation should be thought of, he said, in relation to clean and dirty areas, sterile areas and recovery rooms etc.

The turbulent pattern of airflow in theatres was, Mr. West thought, be be preferred and a common air conditioning plant was suitable for up to four suites.

Mr. West said that, in his Region, noise criteria had been established to suit the varied use of theatres. Fluorescent lighting and piped medical gases had been standardised.

It was difficult to accept standard engineering layouts and standard plans would have to be suitably tailored to suit every site.

Mr. E. S. Greene, Theatre Superintendent at St. James' Hospital, Balham, said that standardised sets of instruments were normally desirable and this simplified checking after operations. Should disposal corridors be omitted then satisfactory alternative arrangements for the disposal of waste and used equipment must be made.

Satisfactory ventilation and planned maintenance were both of great importance.

General Discussion

Opening the first general discussion, Miss E. B. J. Thomas, a Senior Architect at the Ministry, said that there was no bacteriological need for disposal corridors. There was, however, a need to hear various views. How many theatres, for instance, were desirable in a suite and what was the necessary cleaning time? Should a Recovery Room be on the clean or dirty side?

It was also necessary to hear opinions upon environment and upon the desirable size of rooms in suites.

Miss Thomas was followed by Dr. D. C. Hughes, a Consultant Anaesthetist, and Mr. P. Quaife, a member of the S.W. Metropolitan Board's Capital Works Department.

After the lunch adjournment the assembly split in to six separate groups for a syndicate session. The group reports given subsequently in joint session were as follows:—

Group A agreed that a disposal corridor could be dispensed with and that theatre discipline gave no cause for worry.

It was not thought that there would be an adverse effect from outside environment, provided that conditions were right.

Group B also thought that the disposal corridor could be dropped but that money saved should be spent on better ventilation. Nevertheless, a disposal bay had its points.

Special theatres were not necessary if normal ones were properly suitable.

The majority of Group C chose to retain the dirty corridor but said that bagging, though expensive, could work though evidence was lacking. For the latter there would be a need for temporary storage. A conveyor belt was suggested though it proved unpopular.

Surgical teams would increase because work in future theatres would increase. Preventive medicine would add to this.

During discussion, this Group had brought up other points such as that theatre procedures would be simplified, thus taking up less time, and more specialists would be available. More monitoring would be required, it was said, but there was not universal agreement, as this equipment would get smaller.

More space would be required for transplants but theatres should be as generally useful as possible. There would also be a need for more equipment storage space.

Group D said that the saving resulting from dispensing with a dirty corridor would not be as suggested and a bay would be needed off the clean corridor if the latter was used for disposal purposes.

Piped gases should be supplied to the theatre via a ceiling pendant or boom, the latter being preferred. Two booms were the optimum.

That extreme caution should be shown before omitting dirty corridors was the view of Group E, and that this should not be done purely on economic grounds. Doubts also existed on staff grounds.

More research was necessary on cross-infection as, also, on ventilation.

Group E thought that there was much to be said for two corridors, though bagging might be acceptable.

Though TV and video tape were useful, viewing galleries had advantages for showing students staff dispositions and for visitors.

On the Market

A review of new equipment and materials and their development

COUPLER FOR ALUMINIUM WELDING CABLE

The increasing use of aluminium welding cable has prompted **Welding Equipment Service Co. Ltd.** to design what is believed to be the only cable coupler to BS. 638 dimensions especially for aluminium conductor.

This new coupler supplements their existing CS5 Socket and CP6 Plugs, and the new units are CS5/AL and CP6/AL. The couplers are compatible with existing BS. 638 units whether in use on welding cable or on machine outlets.

Normal BS.638 couplers are designed for the entry of copper conductor with clamping or soldering devices appropriate to copper. The Wescol AL couplers are drilled for the larger size equivalent aluminium conductors, obviating the need to reduce the conductor section. This prevents local overheating and premature joint failure.

The Wescol AL couplers incorporate a gland nut and cone locking device which has been proved in service as both simple to assemble and electrically and mechanically sound.

Further information from Wescol Works, P.O. Box 41, Lower Horseley Fields, Wolverhampton.

"SUPERGRID" GRATINGS

A completely new range of Gratings has been introduced by **Frederick Jones and Son** of Ellesmere, Shropshire.

The new "Supergrid" gratings are solidly constructed from 'T' section steel bars using the latest CO_2 welding techniques and are hot dip galvanised. Standard 30 inch units with carrying capacities up to 36 ton laden vehicle rating are available in widths from 6 inches to 24 inches in 3 inch increments and specials for terminations and junctions are supplied as required.

These and other products are described fully in the Company's new SfB folder which lists all sizes, ratings, B.S. equivalents and metric equivalents.

HILL ALDAM INTRODUCE "PIVIDORS"

E. Hill Aldam & Company Ltd., Britannic Works, Red Lion Road, Tolworth, Surbiton, Surrey, have announced a new product, 'Pividors', which comprise doors and twin-fold gear in kit form for built-in cupboards. They are available with 2 or 4 doors (hinged in pairs) covering nine standard opening widths.

An important feature of the door kits is that they have been designed to run in a single overhead track without loss of rigidity. All doors are suitable for openings with a clear height of 6ft 6¼in. from the underside of the head lining to the floor. Adequate clearance is provided under the doors which, together with the fact that only an overhead track is required, enables carpeting to be continued into the cupboard. Only simple framing is required to support the assembled structure.

The Pividors are made in several finishes; faced with top quality Sapele veneers or silkstone hardboard treated ready for painting. The doors are also available in an attractive continental louvred design.

NEW SOOT REMOVER

Of particular interest to engineers with boiler maintenance responsibilities is New Formula Forfol Soot and Deposit Remover. The need to maintain efficiency by keeping heat transfer surfaces free from deposit now is of paramount importance.

Premeasured dosages of Forfol are simply introduced into the combustion zone of the boiler which must be at working temperature. Thus the treatment may be carried out without the need for taking a boiler out of line.

In the best of cases, the combustible elements of the deposit are burnt away by reaction with Forfol and no manual attention is needed, while in all cases the characteristic tenacity of the hard deposit is reduced and cleaning may be effected by use of a stiff brush with or without ancillary vacuum equipment for convenience.

This product is suitable for use with liquid or solid fuels, is non-toxic and non-hazardous, and may be used wherever heat transfer surfaces need to be cleaned, and are at a sufficiently elevated temperature to permit the chemical reaction to take place.

Further details may be obtained from **Forfol Ltd.,** 22 Union Street, Barnet, Herts.

PROTECTION AGAINST EARTH LEAKAGE

An earth leakage protection system with a breaker rating of 100 amps and an unusually high speed of 25-28 milliseconds at 15 milliamps has been introduced by **Winster Electronics Ltd.** of Ilkeston, Derbyshire, for use in all areas where electric current is used.

Although designed primarily for protection of human life against total electric shock, the device will also serve to safeguard electrical apparatus against damage due to electrical faults.

Contained in a neat sheet metal weatherproof enclosure, the system may be mounted on a control circuit switch board, wall mounted against an incoming supply, or attached to heavy portable equipment.

A design feature is that a one trip unit can protect an unlimited number of points within the specified current rating, and, whilst sensitive to faults in the area it is protecting, it remains unaffected by faults on an adjacent circuit.

The unit operates on the core balance principle, whereby currents in the load carrying conductors are summed and, for a normal system, equate to zero. In the event of a leakage current to earth, this balance is disturbed and an output is derived causing an electronic amplifier to actuate a relay. The relay contact is used to operate a shunt strip coil on a circuit breaker or to isolate the operating coil on a contactor.

Efficiency of the unit may be tested as often as necessary by depression of a button which simulates an earth leakage fault and trips the circuit.

Two multi-voltage versions of the system are available, either having an N/O relay contact for shunt trip coil operation or an N/C relay contact for contactor coil operation. The price is £37 10s. and delivery is within 4/6 weeks.

TURBO-RING FORCED DRAUGHT GAS BURNER

Gordon & Piatt Ltd., of 95 Kingsmead Avenue, Worcester Park, Surrey, announce the introduction of the P5 Turbo-Ring Forced Draught Gas Burner to provide an input varying between 200,000 and 650,000 Btu/hr.

The P5 Gas Burner is designed for either natural, induced or forced draught boilers and is suitable for operation on all gases, Towns, Natural, Sewage or L. P.

The Burner is a factory assembled and tested unit and incorporates a control panel enclosing a Fireye UVC Electronic Flame Safeguard which provides pre-purge of the combustion chamber, pilot ignition and proof of pilot flame before main flame on each burner cycle. The patented combustion head provides a recessed ring of gas ports with a controlled supply of primary air.

Each P5 Gas Burner is provided with the complete gas train including both "A" and "B" cocks, Governor, Automatic Shut-off Valve, Pilot Governor and Pilot Solenoid Valve.

PORTABLE PLACENTA LOCALISATION MONITOR

D. A. Pitman Ltd., announce the development of the Model 235P Placenta Localisation Monitor for use at the patient's bedside. The instrument employs the isotope method for patients from 28 weeks of gestation. A permanent record of the placental site is obtained.

The Model 235 consists of a linear ratemeter having four ranges up to 0-3,000 c.p.s. Four selective channels are incorporated which are peaked on specific isotopes such as Tc 99m, Cr 51, I 131 and In 113m. The instrument is battery operated, transistorised and completely portable. No setting up is required and a determination can be carried out in 10 minutes. A unique feature is the 0-120% scale with a variable gain control so that all readings taken over the abdomen are shown as a direct percentage of the precordial count, with no calculations involved.

A remote probe is used with the ratemeter which consists of a 1" Na I scintillation detector and a 1" photomultiplier tube. A detachable collimater suitable for placentography is included. Other probes may be fitted as required.

For further details write to D. A. Pitman Ltd., Mill Works, Jessamy Road, Weybridge, Surrey.

BEESTON BOILER DEVELOPMENTS

Recently, the **Beeston Boiler Co. Ltd.,** of Nottingham, announced a new boiler which works under positive pressure conditions in the combustion chamber.

Known as the Beeston Robin Hood "Series 5" boilers, these units are a radical departure from previous Cast Iron Sectional designs which have never been able to take advantage of the increased heat transfer which can result from the operation under positive pressure conditions in the combustion chamber.

This problem has been overcome in the "Series 5" by the development of a patent intersection joint. In addition, the gas velocities in the secondary zones have been increased again, resulting in high heat transfer rates so that output for output the "Series 5" boilers only occupy one third of the space required by the conventional cast iron sectional boilers. The flue gas travel takes the form of a conventional three-pass system. As the boiler is operated on a fully forced draught combustion system, no chimney draught is required to overcome boiler resistances.

The high heat transfers designed into the unit require that the water flow within the boiler should be positive and controlled and, for this reason, a pump is provided as an integral part of the unit to provide this circulation. This pump is located in a by-pass loop between the main flow and return connections. It cannot, of course, provide any circulating head for the main heating circuits.

PORTEXSIL SILICONE TUBING

Portex Ltd., of Hythe, Kent, under a joint venture with Thermopol Ltd, are now able to offer a comprehensive range of high quality silicone rubber tubing for medical and surgical use. A new trade name, Portexsil, has been registered to cover this new addition to the Portex range of products. Further development which is taking place, will include prosthetics for human implantation.

ROOM THERMOSTAT FOR WARM AIR AND PACKAGE BOILER SYSTEMS

The new Room Thermostat T199 has been designed to control warm air and package boiler systems over the range 40—80°F., with a nominal 1°F differential. Two models are available, one for the standard 240V mains supply and the other for 24V operation.

The thermostat contacts on the T199 are of pure silver and hermetically sealed in an inert gas-filled capsule. The temperature sensing unit is a bimetal spiral and, on the 24V Model, an adjustable series anticipator heater is fitted. On the 240V Model this is arranged in parallel. The switch contacts are rated at 1·5A for both models and they have changeover contacts which make them ideal control devices for motorised zone valves on 'wet' heating systems.

The thermostat is constructed in two parts, the front part containing the temperature sensor, switch mechanism, temperature adjustment anticipator heater and temperature indicator thermometer. This plugs into the backplate on silver-plated plugs and sockets. The back-mounting plate holds the terminal connections and suits the round or square conduit box. Further technical information from **Maclaren Controls Ltd.,** 333 West Street, Glasgow, C.5.

T.A.V. FLOATSWITCHES

T.A.V. Engineering of Christchurch, Hants, have introduced a new range of floatswitches which embody reed switch electrical contacts and a new concept of meeting customer's requirements.

The contacts are able to make 10 amps and break 2 amps at 250 volts A.C. inductive or make 10 amps and break 3 amps at 125 volts.

The floatswitch operates by virtue of an annular ring magnet carried in the float which is free to rise or fall with the vertical movement of the liquid. The float is guided by a central tube and contained within this tube is the electrical contact or series of contacts, the leaves of which meet and complete the electrical circuit as they are embraced by the float permanent magnet.

T.A.V. Engineering have opted to maintain a stock of parts in a variety of materials to produce floatswitches which exactly meet requirements with short delivery and at production prices.

ROTAN PUMPS

Rotan internal gear pumps are of the positive displacement type and are capable of handling a large selection of liquids. Self priming with a continuous pulse-free flow, they have only two moving parts to aid trouble free service and low maintenance. The Rotan is particularly suitable for viscous fluids and can cope with up to 300,000 seconds Redwood No. 1. It is capable of working against a total head of 260 feet, and the large 8″ Rotan RT 200 will give 616 g.p.m. against a head of 200 feet.

This pump is designed to rotate in either direction, and ports can be at right angles or horizontally opposite each other. Steam jackets can be provided for handling liquids that solidify at ambient temperatures or wherever a constant temperature is necessary.

There are sixteen types of Rotan with various modifications to meet any requirements. They are available—standard sizes normally ex stock—from **Jobson and Beckwith Ltd.,** 62 Southwark Bridge Road, London, S.E.1.

NEW CONTRACT CARPET FROM DUNLOP SEMTEX

Dunlop Semtex Ltd, announce Dunlop Semlon, a needlefelt nylon carpet linking quiet luxury underfoot with all the durability and dirt resistance of hard surface floorings, it is claimed. It is available in seven colours and in 25 lin. yd. rolls, 54 ins. and 9 ft. wide.

The carpet is made by amalgamating a first quality nylon needlefelt top layer with a tough, springy fibre base, bound with vinyl resin and consolidated under intense pressure. This produces a stiff but still flexible sheet which, when adhered firmly to the sub-floor, combines the resilience, quietness and luxurious tread of carpeting with the stain resistance and easy maintenance of plastics.

Dunlop Semlon is suitable for installation on most sub-floors, including concrete, timber and asphalt, provided they are structurally sound, dry, smooth, level and free from dust. In the case of direct-to-earth concrete sub-floors, a fully effective damp-proof membrane is required.

CORRESPONDENCE

The Editor, 27th November, 1968

Dear Sir,

I would like to congratulate Mr. Leverton for his Electrical Services article in the November issue. En passant, he mentioned in connexion with medical gases, that liquid oxygen evaporators may be installed for demands in excess of 10,000 cu. ft. per week. The figure at which liquid installations can be considered has in fact been constantly dropping over the years and is now at 3,000 cu. ft. per week. The number of hospitals receiving liquid oxygen has grown rapidly and I think this is a good indication of the universal acceptance of the concept of piped medical gas as being the most efficient method of meeting the increased requirements of modern medicine.

Yours faithfully,

M. LOVEDAY,

British Oxygen Co. Ltd., Medical Gases Department.

Great West Road,
Brentford, Middx.

The Editor,

Dear Sir,

THE METRIC SYSTEM—ARE WE READY?

The British Standards Institution Publication P.D.6030 (February 1967) sets out a programme for the change to the Metric System in the Construction Industry. Whilst this is primarily intended for designers and builders of new buildings, Engineers and other Technical Officers in hospitals will be considerably involved in the change.

By the end of 1968 manufacturers are required to provide technical information in metric terms for their products as they are now produced, and by the end of 1972, are required to manufacture their products to the new metric standards.

It is obvious therefore, that by the end of this changeover period all those connected with the Construction Industry will be required to use metric terms as a matter of course.

A major problem is that of acquainting both Technical Officers and Tradesmen in the use of metric terms and dimensions. For example, calculations involving pressure, temperature, weight, and length, will, in future, be in metric terms. A tradesman ordering or requisitioning materials will need to measure, and order metrically

It can be seen that, in addition to using the terms of the metric system, it is very desirable, even essential, that the user should be able to "think metric." This immediately raises the problem of training, and it seems a much better proposition that this training should be carried out by professional lecturers and teachers rather than others.

A metrication course has been organised by the Salford Hospital Management Committee in association with the Stretford Technical College, Manchester.

The course is broken into two parts:

(*a*) An introductory course of one day per week, for four weeks, attended by all Senior Technical Officers and all Tradesmen.

(*b*) A continuation course of one day per week, for four weeks, attended by Senior Technical Officers only.

The syllabus for the first 4-week part of the course is:

1. An introduction to the Metric System—how easy it is to use compared to the Imperial System—Historical notes—a brief description of S.I. units.
2. Revision and use of decimal arithmetic, with practical examples.
3. Conversion Tables—with practical examples.
4. Group projects—examples using metric measurements.
5. The use of a Scale Rule—taking measurements from a scale drawing with Group Project examples.
6. Course Evaluation– a practical project undertaken by individuals, given Metric Data.

At the end of this 4-week period, Tradesmen leave the course with the ability to:

(*a*) Think in metric dimensions, e.g. the height of a room is say three metres.

(*b*) Take site measurements in metric terms, and understand what they mean.

(*c*) Take off measurements from a scale drawing to metric dimensions.

(*d*) Fabricate and erect from metric data.

(*e*) Requisition and/order materials required in metric terms.

The syllabus for the 2nd four week part of the course, attended by Engineers, and other Senior Technical Officers only, comprises:

1. S.I. units.
2. Preferred numbers, i.e.—Renard.
3. The use of S.I. units in Mechanical, Electrical and Structural Calculations, with examples.

At the end of the complete course, Engineers and others attending should be able to deal with all calculations and measurements etc., in metric terms, and be able to absorb additional changes as and when they arise.

Obviously, courses can and will be modified to suit particular requirements or later developments, but it seems to be essential that staff training, similar to the course described, should be undertaken by all Hospital Management Committees.

As a continuation to training, all staff could be encouraged to quote metric terms whenever possible. Senior Officers can take the lead in this respect by issuing drawings, job notes, etc., using metric dimensions, and by superimposing metric scales on pressure, temperature, and other gauges.

1972 is a mere three years hence, and it is important that all Group and Hospital Engineers, Building Supervisors, Foremen and Tradesmen, should be fully able to deal with the metric system once the changeover is complete. The system will be infinitely more simple than our current one, and, once the initial changeover difficulties are overcome, the benefits will be appreciated by all concerned.

Yours faithfully,

KEITH WRIGHT, G.I.H.V.E.,

Group Engineer, Salford H.M.C.

Salford, Lancs.

Notes for Members

OBITUARY

B. N. Tolchard

We regret to announce the death of Mr. Bernard Newberry Tolchard.

Mr. Tolchard served an apprenticeship in the Royal Navy, beginning in 1914, and subsequently reached the rank of Chief E.R.A. before retiring on pension in 1938. He was recalled to the Service in the following year and remained throughout the war in the Minesweepers *Speedwell* and *Fitzroy* and as senior Chief E.R.A. in the cruiser H.M.S. *Suffolk*.

In 1938 Mr. Tolchard had been appointed Engineer-in-Charge at the South London Hospital for Women, and his duties there were, of course, interrupted by the war. He was elected an Associate Member of the Institute in 1947, and a Life Member upon retirement from the Hospital Service in 1963.

ELECTIONS TO MEMBERSHIP

Applications for membership have resulted in the following elections:—

Members

Bailey, G., Salisbury, Rhodesia; Government of Rhodesia.
Farndale, A., Cambridge; East Anglian R.H.B.
Graham, W. P., Birmingham; Birmingham R.H.B.
Lambert, H. E., Salisbury, Rhodesia; Government of Rhodesia.
Mansfield, L. M., Nottingham; Heat Transfer Ltd.
Melrose, J. D., Bedford; Bedford Group H.M.C.
Paton, W., Solihull; Highcroft H.M.C.
Poole, R. C., Oxford; United Oxford Hospitals.
Pragnell, B., London; Chelsea & Kensington H.M.C.
Smillie, J., Birmingham; Coleshill Hall Group of Hospitals H.M.C.
Smith, A. G. E., Wroughton; Ministry of Public Buildings & Works.

Upgraded to Member

Kandes, F. R., Brentwood; Warley H.M.C.

Associate Members

Bainbridge, W. O., Sunderland; Durham H.M.C.
Barber, H., Newark; Nottingham No. 1 H.M.C.
Broke, M., Hull; Hull 'B' Group H.M.C.
Button, T., Cardiff; Cardiff H.M.C.
Byrne, P., Watford; Leavesden Group H.M.C.
Carson, P. G., London; Hackney & Queen Elizabeth Group H.M.C.
Chater, A. H., Birmingham; Birmingham R.H.B.
Cotter, L. J., Cork; Cork Health Authority.
Davenhill, J. H., Aldridge; Birmingham R.H.B.
Fuller, D. M., Boston; Boston Group H.M.C.
Gosal, J. S., Solihull; Monyhull H.M.C.
Gregory, M., Keswick; East Cumberland H.M.C.
Hall, J. W. G., Brighton; Brighton & Lewes H.M.C.
Hemsley, R. F., St. Albans; Verulam Group H.M.C.
Hillier, C., Farnborough; Kings College Hospital.
Hogg, R. T., Brentwood; Brentwood Group H.M.C.
Hollins, R., Stoke-on-Trent; Stallington H.M.C.
Lightfoot, J., Urmston; West Manchester H.M.C.
Parkes, E. R., Birmingham; Birmingham R.H.B.
Smith, C. J. H., Farnham; Farnham Group H.M.C.

Upgraded to Associate Members

Mason, M. M., Worcester; South Worcestershire H.M.C.
Nicholson, D. F., Preston; Whittingham H.M.C.

Graduate Members

Boyce, R. P., Thornton Heath; Croydon & Warlingham Park Group H.M.C.
Pyle, W., South Stanley, United Newcastle-upon-Tyne Hospitals.
Roy, S., London; Royal National Orthopaedic Hospital.
Wooding, J. C., Liverpool; Liverpool R.H.B.

Student Member

Harris, A. R., Bristol; Hoare, Lea & Partners.

Associates

Badger, D., Blackburn; Bayliss Kenton Installations Ltd.
Machin, V., Sheffield; Sheffield R.H.B.
Selley, J. N., Durham; Spirax Sarco Ltd.

PRESIDENT-ELECT

Mr. George A. Rooley, C.Eng., M.I.C.E., F.I.Mech.E., F.Inst. F., P.P.I.H.V.E., M.Cons.E., has been elected President of the Institute of Hospital Engineering, to succeed Mr. L. G. Northcroft in the spring of 1969.

MEMBERSHIP RECORDS

To comply with the Companies Act, 1948, the Institute is obliged to establish a comprehensive, additional set of Membership records. To enable this task to be completed, the Secretary will distribute a form to members (with the subscription forms, at the end of the year).

Members are urgently requested to co-operate by completing this and returning it to the Secretary at 20, Landport Terrace, Southsea, Hampshire.

FIRE PREVENTION CONFERENCE

We learn from Mr. J. F. Leatherbarrow, Chief Officer of the Leavesden Group Hospital Fire Brigade, that, due to the goodwill of the Leavesden Group H.M.C., lecturers, Fire Appliance firms, and with more people attending the Fire Prevention Conference than had been expected, there was a balance after all expenses had been met.

As the conference had been arranged solely for "fire prevention" purposes and not for cash gain, the total balance has been allocated as follows:—

The Leavesden Hospital Patients Fund, £5 0s. 0d.

The British Fire Services Association Widows & Orphans Fund, £5 0s. 0d.

The National Fire Services Benevolent Fund, £3 15s. 0d.

NATIONAL POST-EXPERIENCE COURSES, 1969

Members are advised that the Ministry of Health has indicated approval for the Institute staging two further Courses next year. These will be held, again, at the University of Keele.

The Course for Group and Hospital Engineers will take place from 20th to 25th July and that for Assistant Engineers will run from 21st to 26th September.

Details will be circulated to Regional Hospital Boards, Boards of Governors, Boards of Management and Hospital Management Committees early in the New Year and it is hoped that the majority of nominations will be received by the end of April and the end of June respectively.

NORTH EASTERN BRANCH

A Meeting of the North Eastern Branch was held in the Lecture Theatre of the Royal Victoria Infirmary, Newcastle, on Tuesday, 1st October, 1968, to hear a lecture entitled "Centralised Control and Supervision of Heating and Ventilating Plants in large buildings". Thirty-two members and guests were present.

The lecture was in two parts:

Mr. K. A. Howes, Application Engineering Manager of Satchwell Control Systems Ltd., read a paper entitled "Supervision and Monitoring of Heating and Air Conditioning Plant". This described a system of centralised alarm, indication, and selected control facilities employing time-sharing of cables to reduce installation costs (The Satchwell "Autoscan").

This paper was followed by one from Mr. C. R. Beaumont, of Elliott Process Automation Ltd., describing the application of an Elliott R900 Computer to the environmental control of an entire new hospital in South Africa. This computer replaces approximately 600 individual temperature and humidity controllers throughout the building, and provides facilities for alarm and log print-outs, variation of control set points and control equations, and many more sophisticated details. In a hospital of this size and complexity this system was found to be an economic proposition.

Both papers were received with great interest, as they presented a view of things to come in hospital environmental engineering.

MIDLANDS BRANCH

Members of the Midlands Branch of the Institute of Hospital Engineering spent a very interesting evening at the Kidderminster factory of the British Sugar Corporation on 1st November.

Visitors toured the factory and observed the process from the unloading of the sugar beet through to the packing and parcelling of the refined white sugar. This was a very illuminating and worthwhile visit. Refreshments were provided following the tour and members were presented with a souvenir of the visit.

About 30 members and visitors attended a meeting on 2nd November, 1968 at Lea Hospital, Bromsgrove, where the afternoon's programme commenced with a film produced by John Laing (Construction) Ltd. which showed the various stages of the erection of Coventry Cathedral, leading up to the inauguration service and the official opening. The film ran for 45 minutes and was of particular interest from the construction point of view. It was followed by a discussion on Contract versus Direct Labour.

Future Events—4th January, 1968

The next meeting of the Midlands Branch will be held at Good Hope Hospital, Sutton Coldfield, when the main speaker will be G. W. Howells, B.Sc.(Econ.), who will talk on "Reasoning Processes in Decision Making." Mr. Howells is a very experienced lecturer at the University of Aston and has spoken before to engineers in the Birmingham Region on matters of management principles. The talk will be followed by a film entitled "Building as a Team."

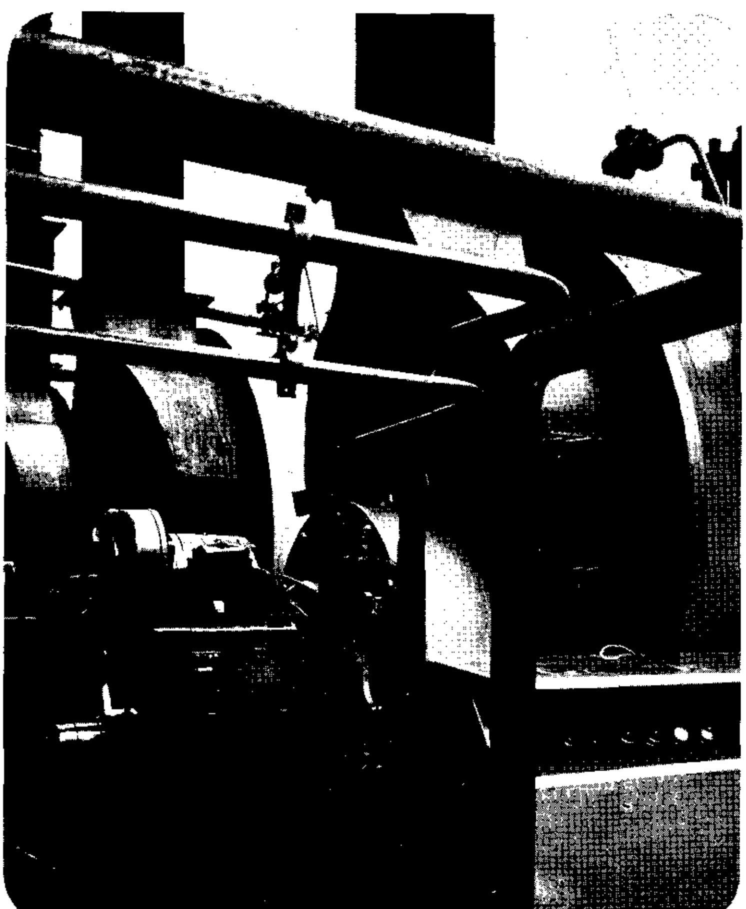
Visitors will be welcome at the meeting which begins at 2.15 p.m.

EAST MIDLANDS BRANCH

On 16th October, Mr. K. J. Eatwell, Mr. D. H. Mellows (Members of Council) and Mr. J. E. Furness, Secretary of the Institute, attended a meeting of the East Midlands Branch held at St. John's Hospital, Lincoln. The meeting took the form of a Question Forum, with Mr. G. B. Metcalfe as Chairman, and produced a most lively afternoon of questions and discussions.

The visitors were most grateful for the welcome and hospitality extended to them.

Index to Advertisers



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Classified Advertisements

SITUATIONS VACANT

UNIVERSITY COLLEGE HOSPITAL,
GOWER STREET, LONDON, W.C.1

GROUP ENGINEER

Required to be responsible to the Board of Governors for the organisation and control of the whole range of engineering and building services of this undergraduate teaching hospital group. A substantial major capital programme is in progress, in addition to the normal maintenance services and minor capital works. A salary scale of £2,515 to £2,995 inclusive has been specially approved by the Department of Health and Social Security, for a chartered engineer. Further particulars and form of application can be obtained from the Administrator and Secretary, returnable by 20th January, 1969.

MOORHAVEN HOSPITAL MANAGEMENT COMMITTEE

GROUP ENGINEER required for psychiatric hospital group of 764 beds. Salary scale (12½ to 24 points) £1,550 to £1,805 per annum for qualified staff, plus responsibility allowance of £50. Additional gratuity paid as appropriate for hours worked over 45 per week.

The main boiler plant has just been converted to oil firing. Applicants must have had wide experience in the management of mechanical and electrical engineering plant similar to that of modern hospitals, and should hold the following qualifications:—

(i) Higher National Certificate or Higher National Diploma in Mechanical Engineering with endorsements in Industrial Organisation and Management and Principles of Electricty or Electro-Technology, if this was not taken as a subject of the course; or

(ii) Higher National Certificate or Higher National Diploma in Electrical Engineering with endorsements in Industrial Organisation and Management and including (at S.III or O2 level, or with endorsement in) Applied Heat and Applied Mechanics, provided he has suitable practical experience in mechanical engineering; or

(iii) City and Guilds Mechanical Engineering Technicians Full Technological Certificate (Part III) which must include Plant Maintenance and Works Service.

The successful applicant will also be responsible for building maintenance work with a small direct labour building section.

Salary scales, conditions of service and qualifications will be in accordance with those laid down by the appropriate Whitley Council.

The successful applicant could be non-resident, but temporary accommodation may be made available.

Applications, stating age and full personal particulars, details of training, qualifications and experience, and names and addresses of three referees, to be sent to the Group Secretary, Moorhaven Hospital, Ivybridge, South Devon by 31st December, 1968.

The post will be vacant by 1st June, 1969, owing to retirement.

ELECTRICAL ENGINEER

(£1,825 p.a.)

and Deputy Chief Engineer for large Teaching Hospital. Corporate member of the Institute of Electrical Engineers preferred.

The details of the successful candidate's responsibilities can be worked out to suit his particular background, but ideally we would want him to assume overall responsibility for the electrical engineering aspects of the work with particular responsibility for the electrical requirements for new installations. As he will deputise for the Chief Engineer in a broad capacity, evidence of management experience would be a distinct advantage.

The range of plant and equipment is becoming increasingly wide and an interesting and varied career in hospital engineering can be assured.

Write to the House Governor, The London Hospital, E.1.

WEST HERTS GROUP H.M.C.

Applications are invited for the post of Hospital Engineer to become vacant on the retirement of the present Engineer on 1 February, 1969 at Shrodells Wing of Watford General Hospital. This hospital is at present undergoing a major redevelopment and will ultimately have a total of 800 beds. Salary range £1,270—£1,500, with a special responsibility allowance of £50 per annum. Qualifications required are Higher National Certificate in Mechanical or Electrical Engineering. Applications giving full particulars and the names of two referees should be addressed to The Secretary, West Herts Group Hospital Management Committee, 9, Rickmansworth Road, Watford, Herts., by 31 December, 1968.

THE UNITED LIVERPOOL HOSPITALS

Applications are invited for the post of DEPUTY SUPERINTENDENT ENGINEER for The United Liverpool Hospitals, which is a group of nine teaching hospitals with 1,570 beds. A new general teaching hospital and a new dental hospital are currently under construction and these will replace a number of the older buildings. The person appointed will deputise over the whole range of duties of the Superintendent Engineer which include building maintenance and responsibility for the efficient operation of engineering plant and services, including electro-medical and other specialised apparatus. Practical experience in hospital engineering and in the design and construction of new works would be an advantage. Preference will be given to candidates who are professionally qualified holding Corporate membership of the Institution of Mechanical or Electrical Engineers and for whom the salary scale is £1,685 x £65 (1) x £66 (1) x £67 (2) x £70 (1)_£2,020 per annum, which will be deemed to include payment for special responsibilities. The salary scale for persons not so qualified is £1,570 x £40 (1) x £45 (2) x £50 (1) x £55 (1)_£1,805 per annum. Whitley Council terms and conditions of service will apply.

Applications stating age, qualifications and experience together with the names of three persons to whom reference may be made should reach the Secretary, 80 Rodney Street, Liverpool L1 9AP by Monday, 30th December, 1968.

DUDLEY, STOURBRIDGE & DISTRICT HOSPITAL
MANAGEMENT COMMITTEE

THE GUEST HOSPITAL, DUDLEY

ASSISTANT ENGINEER

Applications are invited for the post of Assistant Engineer. Applicants must have completed an Apprenticeship in Advanced Engineering and have a sound practical training in mechanical engineering.

Applicants must also hold an Ordinary National Certificate or equivalent qualifications approved by the Ministry of Health.

Salary from £975—£1,270 per annum.

Applications giving full details together with names and addresses of three referees to be received by 31st December, 1968 and addressed to The Group Secretary, Dudley, Stourbridge and District Hospital Group, The Guest Hospital, Dudley, Worcs.

QUEEN VICTORIA HOSPITAL, EAST GRINSTEAD, SUSSEX

Applications are invited for the post of Hospital Engineer at this hospital, which is a modern complex, having a wide range of plant and equipment, with the emphasis on complicated electrical equipment. There are automatic oil-fired boilers and fully air-conditioned Burns Unit, with a 50,000 c.f.m. air conditioning plant. These would afford valuable experience to an engineer wishing to progress in the Service.

Applicants must have acquired a thorough practical training appropriate to the responsibilities and duties of the post and must hold one of the following qualifications, or an approved equivalent:—

(a) Higher National Certificate or Diploma in Mechanical Engineering, with endorsement in Electro-Technology;

(b) Higher National Certificate in Electrical Engineering with endorsement in Heat Engines;

(c) City and Guilds Mechanical Engineering Technicians full Technology Certificate (Part III) which must include Plant Maintenance and Works Service.

Salary scale: £1,270—£1,500 p.a. plus £75 p.a. special responsibility allowance. Salary to be abated by £150 p.a. if not in possession of approved qualifications.

Applications giving details of age, training, qualifications and experience (in chronological order), with names and addresses of two referees, to be sent to the Group Secretary, Tunbridge Wells Group Hospital Management Committee, Sherwood Park, Pembury Road, Tunbridge Wells, Kent, not later than 31st December, 1968.

Intending applicants may view the hospital if desired.

ROYAL EARLSWOOD HOSPITAL MANAGEMENT COMMITTEE

HOSPITAL ENGINEER required for Farmfield Hospital, Horley, and Forest Hospital, Horsham. Thorough knowledge and experience of operation and maintenance (on planned preventative basis) of steam boilers and distribution systems, electrical and other mechanical plant. Qualifications as laid down by Whitley Council essential. I.H.E. Membership an advantage.

Salary scale £1,270—£1,500 per annum. House may be available. Preliminary visit may be arranged. Apply by 11/1/69 stating age, experience, qualifications, and names of 2 referees, or write for further details to Group Secretary, Royal Earlswood Hospital, Redhill, Surrey.

HILL END HOSPITAL, ST. ALBANS, HERTS.

(786 Psychiatric Beds)

HOSPITAL ENGINEER

Candidates should have completed an apprenticeship in mechanical or electrical engineering, have a wide experience in the management of mechanical and electrical engineering plant similar to that found in hospitals, and must hold one of the following qualifications:—

City and Guilds Mechanical Engineering Technicians Certificate (Part II) which must include Plant Maintenance and Works Service; OR City and Guilds Certificate in Plant Engineering; OR Ministry of Transport First Class Certificate of Competency which includes an Ordinary National Diploma or Ordinary National Certificate; OR equivalent qualifications approved by the Ministry of Health.

The successful candidate will be expected to reside within easy distance of the hospital. Single accommodation can be provided and a three bedroom house may be available in due course. Salary scale up to 24 points range, £1,270—£1,500 per annum plus £50 per annum special responsibilities allowance.

Applications stating age, experience and naming two referees to Hospital Secretary, Hill End Hospital, St. Albans, Herts by 20th December, 1968.

ASSISTANT ENGINEER required to assist the Hospital Engineer over the whole range of his duties. Applicants should preferably be familiar with Oil-Fired Boilers, Sterilising, Laundry and Kitchen equipment, and possess the O.N.C. Excellent facilities for further study. Salary on scale £975-£1,270 per annum plus London Weighting £90 p.a. Apply to Hospital Secretary, St. Mary's Hospital, Harrow Road, W.9 (formerly Paddington General). Tel: 286 4884.

HEREFORD GROUP HOSPITAL MANAGEMENT COMMITTEE

COUNTY HOSPITAL—331 BEDS

Hospital Engineer required at the County Hospital, Hereford, to be responsible to the Group Engineer.

This hospital is being developed as a District General Hospital and capital works are already in progress.

Planned Maintenance has been introduced.

National conditions regarding experience and academic qualifications apply.

Salary scale £1,270/£1,500 per annum plus special responsibility allowance of £25. Residential facilities may be available.

Applications, stating age, training, qualifications and full experience, together with the names of three referees, to The Group Engineer, Hereford Group H.M.C., Victoria House, Eign Street, Hereford.

HOSPITAL ENGINEER required for St. Thomas' Hospital, London, S.E.1. The successful applicant will be responsible for the operation and maintenance of the wide range of engineering installations of this teaching hospital which is being rebuilt at present. Applicants must have H.N.C. or equivalent and will be required to apply modern management techniques in the maintenance function. Many of the installations are electronically controlled and a knowledge of modern control systems is desirable. Salary Scale: £1,560-£1,795 p.a. The Hospital Engineer will normally be entitled to a long hours gratuity of 10 per cent of basic salary. A modern flat may be available if required. Further details and application forms available from Personnel Officer.

MISCELLANEOUS

CIRCULATING PUMPS and Steam Turbines. Complete units, electric and steam, spares and service. **TURNEY TURBINES Ltd.**, 67, Station Road, Harrow. Tel: 1355 and 3349.

GUILLOTINES. Revolutionary "GABRO" machines provide 0 to 10G (12G Stainless) Capacity, straight and notching, to UNLIMITED, UNDISTORTED length for £60. Full details, GALE BROS. (ENGINEERS) LTD., Smallfield, Horley, Surrey. Tel.: Smallfield 2157.

How to see clear profits in the 70's

(Coal can help you do it)

The food for Smedley's Power Plant is Coal

Every month millions of units of canned and quick frozen food roll off the production lines at Smedley's seven British factories. Household necessities like garden peas, green beans, fried potato chips, Brussels sprouts, new potatoes, carrots, broad beans and mixed vegetables. And savoury items like fish cakes, Cornish pasties and beefburgers. Every item is so hygienic and perfect in condition that the housewife takes them for granted.

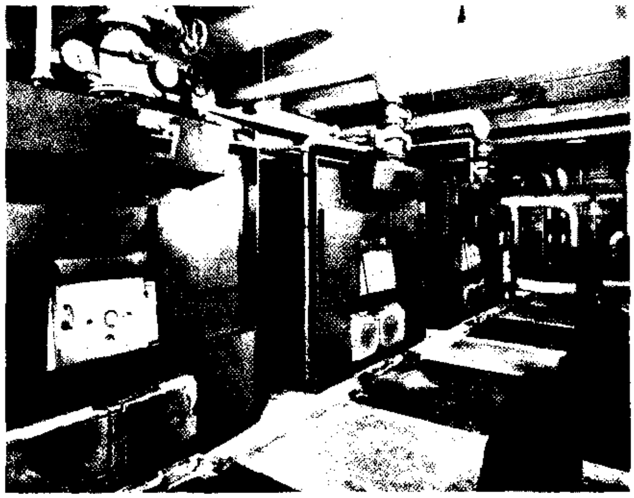
It all adds up to sophisticated production methods and perfect quality control. How it is done is Smedley's own secret. But one thing can be said – coal is the 'food' which powers Smedley's production plants, keeps them running smoothly and efficiently. Coal, burned in modern automated boiler plants, equipped with chain grate stokers, takes Smedley's profitably forward into the 'seventies. Coal is the fuel that offers Smedley's a guaranteed supply coupled with stable prices, and helps to keep maintenance costs low. Smedley's products must be perfect every time because the public depends on them. And coal helps to keep them that way.

Twin Danks of Netherton economic boilers which provide steam for heating and process work.

A fully automatic Noirot (Charrold) handling installation moves coal from storage point to boiler feed hoppers.

Green Beans are inspected after being mechanically topped and tailed.

A long-term investment in power.



The Earleymil System of Combustion — Automated, Efficient, and Highly Versatile.

Earleymil is essentially a fuel and labour saving system for the production of heat, versatile enough for use with domestic and industrial sectional boilers, and also in the horticultural and malting industries. Its low installation and running costs have been proved in many installations.

The basic conception is very simple.

A hopper above the boiler holds enough fuel for 8-24 hours' combustion – or more, according to heat demanded of the boiler. From the hopper, fuel is automatically fed through to the fire box, where an ingenious and foolproof system ensures that absolute combustion takes place leaving only a small quantity of clinker for removal. This and the re-filling of the hopper take only a few minutes a day.

For boiler-houses with three or more boilers, Earleymil have developed an automatic system for delivering fuel to the hopper and this provides a further valuable saving in labour costs.

'Ideal Standard' No. 7 series 'Vanguard' boilers

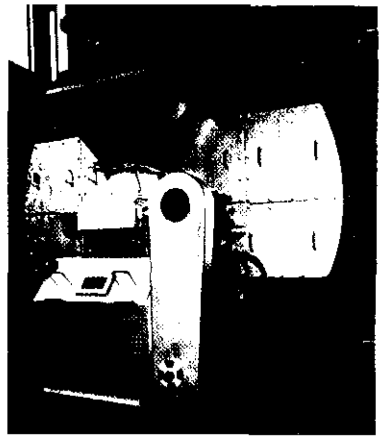
As buildings grow taller, methods of heating them become a problem. This is because the higher pressures involved limit the choice of boilers and the metal from which they are made. 'Ideal Standard' have a new solution to this problem which apart from withstanding these pressures, offers improvements in total installation costs and resistance to corrosion. This new metal is Spheroidal Graphite cast-iron.

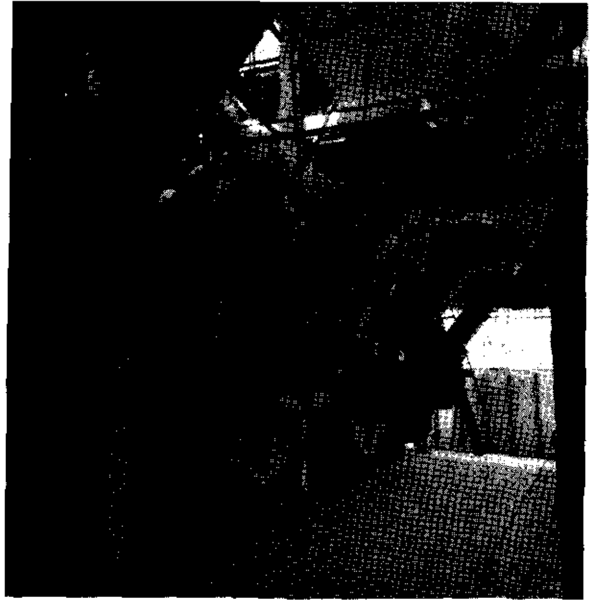
Using new high efficiency sections, 'Vanguard' boilers are easy to install, especially where access to the boiler house is restricted. The boilers are made in sizes ranging from 2,480,000 to 3,894,000 Btu/h, and a mechanical stoker of the underfeed type is recommended.

'Ideal Standard' also produce a 'Vanguard' range in grey cast-iron suitable for buildings of average height. Like all modern coal-fired installations, 'Vanguard' boilers are highly automated and economical in capital outlay and operation.

The Oldbury Spreader Stoker, made by Edwin Danks & Company (Oldbury) Limited, is a natural development of the conventional chain grate stoker. It is designed to burn a wide range of fuels, some of which may be unsuitable for the conventional chain grate stoker, with the minimum of clinker and offers the further advantage of automatically discharging ash.

By using the automatic fuel handling "Oldbury" traversing screw elevator, the only manual work required is to empty the ash container. The spreader stoker conforms to the Clean Air Act since particular attention has been paid in its design to the control of smoke and grit emission.





CASE HISTORY No. 9

AT CAMBRIDGE: coal keeps down hospitals' fuel costs.

Post-war expansion and improvement of patient, laundry and engineering services at the Fulbourn Hospital, Cambridge - coupled with the erection of the new Ida Darwin psychiatric hospital on an adjacent site - resulted in the opening, in September 1966, of a completely rebuilt and re-equipped, coal-fired boilerhouse. This replaced the earlier, decentralised coal-and-oil-fired boilers which had become inadequate.

At the same time, a new central calorifier chamber - to service the improved space heating and hot water systems - an 80 ft. high cold water storage tower, a centralised range of engineers' workshops, stores and offices, a new incinerator and bin cleansing building, have all been provided.

The four new, coal-fired boilers are of three-pass, wet-back, Economic type - manufactured by John Thompson (Wolverhampton) Ltd., and each rated at 13,000 lb/h. Mechanical firing is by low-ram coking stokers and each boiler is fitted with induced draught fans, grit arrestors, and complete instrumentation.

The coal is transferred mechanically by elevator and conveyor from ground-level storage to overhead bunkers, from which it is fed, under automatic controls geared to the required steam output, to each boiler firing mechanism. Ash removal has also been automated, the ash being moved from boilers to an outside silo by submerged conveyor and automatically-operated hoist.

Fulbourn's up-to-date coal-firing equipment permits the burning of a cheap grade of fuel, while plant attention is minimised by the installation of modern coal and ash handling methods, and fully automatic controls.

CASE HISTORY No. 45

AT BOURNE: Coal the best treatment for hospital heating.

A new boiler was installed and commissioned by the Sheffield Regional Hospital Board at St. Peters Hospital, Bourne, Lincs. in 1965 following consultations with the N.C.B. technical services branch. This replaced an existing steam installation, for having closed the hospital laundry, steam was no longer required.

Three new low-pressure hot water boilers were installed, two Potterton MEG cast iron sectional boilers type MU7-KR7 each rated at 1,240,000 Btu/h and one Potterton MEG type MU5-KR4 rated at 720,000 Btu/h.

These boilers, under normal conditions, are capable of operating efficiency at excess of 75% - giving great economy in fuel consumption. All three units are fired by a Riley 'Direkto' bunker type underfeed mechanical stoker, and the coal (washed singles) is delivered pnuematically into the fifty-ton bunker, cutting labour costs considerably.

For economy and efficiency, the Sheffield Regional Hospital Board have discovered that they were right to choose coal for St. Peters, where - as with many consumers large and small - it will continue to be used for years to come.

See back page for latest developments in automated coal-burning equipment.

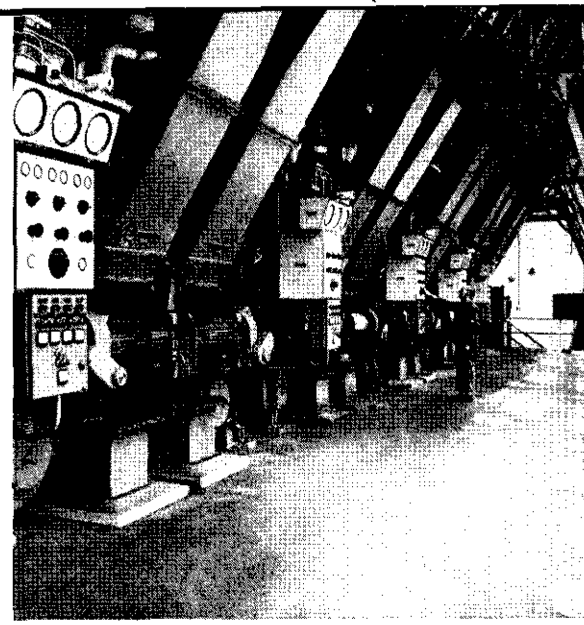
CASE HISTORY No. 150

AT HOLMES CHAPEL: hospital chooses coal for cleanliness.

Cranage Hall Mental Hospital has grown steadily in recent years. A new villa, laundry, kitchens, an audiology unit and a children's autistic unit, have brought the number of beds to a total of 574. Plans are already in hand for a further expansion costing £1,250,000.

To meet the increasing demand on hot water, steam and space heating, a new boilerhouse was built and equipped with the latest automatic solid-fuel plant. With its own eating quarters, washrooms, showers and toilets, it is an outstanding example of the cleanliness that can be achieved with modern coal-fired equipment.

The steam-raising plant centres around three Ruston & Hornsby horizontal Thermax boilers, two rated at 10,000 lb/h and one at 5,000 lb/h, operating at a pressure of 100 lb/in^2. Firing is by Hodgkinson low-ram coking stokers, and fuel is mechanically elevated from the 27-ton bunker to the stokers. A compact instrument room gives the one attendant per shift a quick visual picture, and complete control of steam-raising consumption and demand throughout the entire hospital. Cranage Hall is a clear demonstration of the cleanliness, economy and efficiency with which modern solid fuel equipment can serve a hospital.



CASE HISTORY No. 20

AT CARDIFF: Coal included in plans for new hospital.

The University Hospital of Wales (the largest hospital development in the country) now being built at Cardiff, is expected to be completed by January, 1971. The project includes Medical, Dental and ancillary training schools. There will be some 800 beds and accommodation for 800 resident staff and students.

The boiler plant is already completed and consists of six 16,000 lb/h. Ruston & Hornsby Wet Back Economic Boilers working at 140 p.s.i., fired by local Washed Smalls on John Thompson chain grate stokers. The coal is mechanically handled, after being tipped by lorry into the boot of the inclined belt conveyor, and distributed by conveyor belt to the storage bunkers. Ashes are disposed of by means of a submerged conveyor belt to a bunker and from there they are removed by contract.

The boiler plant will serve the whole project - economically, cleanly and efficiently.

The 1970s start here: in these pages you will read how people responsible for heat and power are basing their long-term plans on coal.

Coal is the one fuel that can offer you a guaranteed supply coupled with stable prices – prices as low as Britain's most dynamic industry can hold them.

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Let's talk it over. As you can see from the case-histories here, there are three basic problems which can be solved by modern automated coal-burning equipment. How to spend less on fuel. And how to cut down on both labour and maintenance costs.

You are probably looking for the answer to at least one of these problems. Coal-firing can provide it – but exactly how depends very much on your special requirements. This is why we should be glad to arrange for an NCB representative to visit you and discuss your problems.

This service is entirely free. For details and for any other information on modern coal-burning techniques please write or 'phone your nearest NCB Regional Sales Office.

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