The Irish Plumber and Heating Contractor, December 1961 (complete issue)

THE IRISH PLUMBER & HEATING CONTRACTOR

VOLUME 1 NUMBER 9 DECEMBER, 1961

SPECIAL SURVEY—ELECTRIC HEATING SYSTEMS

https://arrow.tudublin.ie/bsn/vol1/iss9/1
DOI: 10.21427/D78T5V

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Vol. 1. No. 9.

The only publication in Ireland for the craftsman plumber and contractor, the heating, ventilation and insulation engineer and contractor, the electrical contractor, supplier, manufacturer and wholesaler of fittings and equipment for the trades.

Published monthly by Irish Trade & Technical Publications. Annual subscription, 21/-, post free. Single copies, 1/9, post free.

Editorial and advertising offices:
Callaghan Chambers,
13/15 Dame Street,
Dublin, 2. Tel.: 56466.

DECEMBER, 1961.

THE IRISH PLUMBER & HEATING CONTRACTOR

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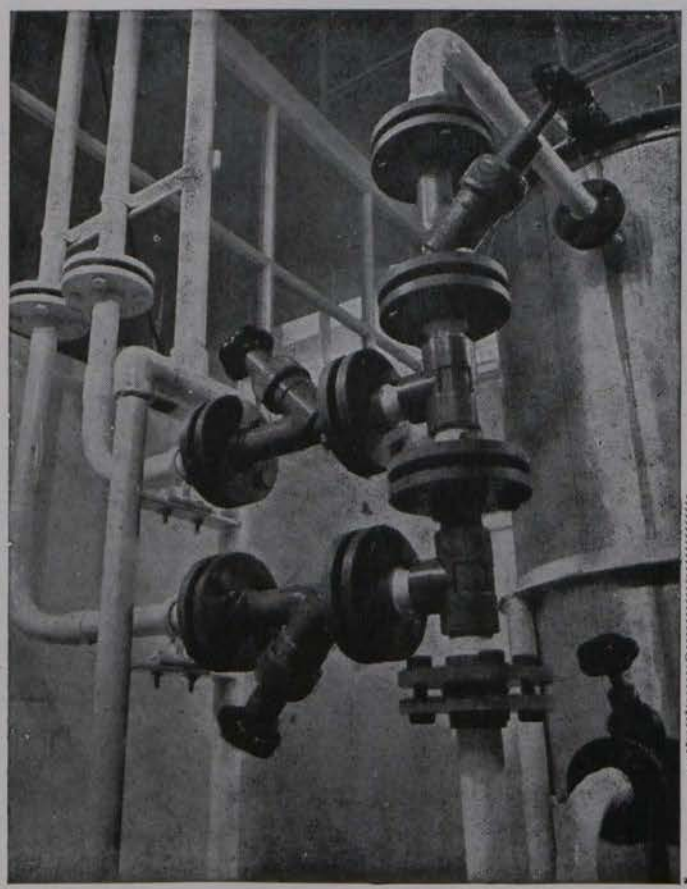

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FAULTS IN HOT WATER SUPPLY SYSTEMS

the author

JOHN G. BOLTON, Lecturer in Plumbing and Heating at the College of Technology, Bolton Street, Dublin.

ALTHOUGH domestic hot water systems can be considered virtually foolproof when installed by qualified craftsmen, there will always be the odd case where trouble arises, and it is then that the skill and knowledge of the plumber becomes essential if the job is to be put right.

Take, for instance, a case where the complaint states that cold water is coming from the hot taps, even though the heat of the flow and return pipes and the cylinder indicate that the boiler is working properly.

This is not an unusual problem, especially where the system is old and constructed of lead pipe. The defect may arise suddenly or may develop gradually. The solution in this case is usually very simple—the end of the expansion pipe has dipped into the cold water tank and back siphonage has taken place.

In old houses the lead expansion pipe was commonly bent over the tank so that any expelled water or steam would fall directly into it. In the course of years the lead, if not properly clipped in the first place, may have gradually sagged until the open end dips into the water, so forming a perfect siphon.

When this happens, and a hot tap on the system is opened, the water from the cold tank may, if the crown or top of the bent pipe is not too high, simply flow to the lower tap because of the fact that cold water is heavier than hot and therefore prevents the hot rising from the cylinder. The remedy is simple—clip the pipe properly!

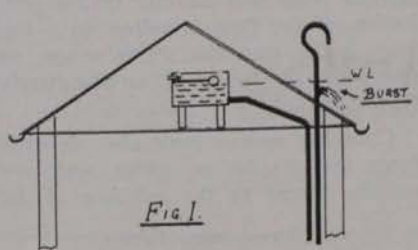

FIG. 1.

Now, for another case with a slightly different problem. Here the complaint was the same—cold water flowing from the hot taps—but in this case the cylinder was ice cold, the flow-pipe slightly warm and the return cold. A big fire was burning under the boiler as the weather was very cold and frosty.

On checking the system it was found that the ballcock in the tank was continuously running. The lead expansion pipe was not visible as it was brought out through the roof at another point. Quite obviously a burst had occurred, but no sign of it could be seen.

It was then noticed that water was flowing from a rainwater pipe at the back of the house, and when ladders were erected, a frost burst was found at the point where the expansion pipe protruded through the roof (Fig. 1). When repaired and the pipe properly insulated to prevent further trouble, the hot water tap again delivered hot water.

Air locks

FOR gravity circulation to take place in a hot water system, it is, of course, unnecessary to stress that all pipes be on a gradual rise, but again, cases are seen where this principle is not observed—sometimes through age such as old lead circulating pipes sagging, and again, even on new work, where the spirit-level was not used.

The author had a case in a public building in Dublin, where air lock developed on a new job and could not be traced easily. On a thorough check being made, it was discovered that in one room the pipe, which to the eye was on a generous rise, was, in fact, falling the wrong way. This had happened because the plumber had used the ceiling as a base from which to set out the levels—but unfortunately for him, the ceiling had a fall of 2in. towards one end! The moral—use a spirit-level.

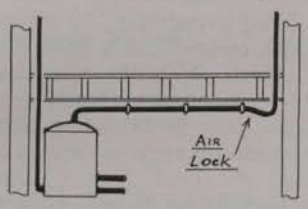

FIG. 2.

Another similar case to this was an air lock on the cold feed to a cylinder. From the tank, the pipe ran horizontally for a short distance and then dropped vertically to the cylinder. The air lock was found at the point where the pipe dropped, and the slight rise that occurred at this point was almost unnoticeable.

Cylinder collapse

THIS is a frightening experience for the householder because the whole affair occurs in a matter of seconds. One moment the cylinder is perfect, the next, it is flattened as if by a heavy hammer.

The root cause of this is a vacuum (partial or complete) forming inside the cylinder so allowing the air outside to crush in the cylinder wall. The total pressure on an average 30-gallon cylinder by the atmosphere—at approximately 14½ lbs. per sq. in.—is in the region of 12 tons, but so long as the water or air inside is subjected to the same pressure through

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ALWAYS THE CASE WHERE TROUBLE ARISES

an open expansion pipe everything is perfect.

It is when the expansion or vent pipe gets chocked that the trouble starts. There are several ways in which this can happen—frost or air lock being principally the chief cause, although sediment at a bend may also play a part. Note the many cases of cylinder collapse in frosty weather. Collapse due to this cause is often because the expansion pipe is carried through the roof (Fig. 1) and not insulated, so allowing the water to freeze and form an ice plug.

This makes the hot water system a closed unit so that when steam or air is released from the heated water it collects at the crown of the cylinder and has no means of escape except when the hot water taps are opened. If this does not take place for a few hours, the volume of the steam and air increases, gradually pushing the water downwards in the cylinder and up the cold feed to the tank. Eventually, this may result in the cyclinder being threequarters full of steam and compressed air and one-quarter full of hot water. Now, if a hot tap be opened, the steam and air rushes out, but the water from the tank is unable to flow in fast enough the fill the partial vacuum which results and immediate collapse takes place, much to the consternation of the person who opened the tap.

Night hours

THE same thing will occur under certain conditions when the cylinder is cooling down during the night hours. Here, if the expansion is choked, and the cold feed stop valve is accidentally closed, the water, in cooling, contracts, thereby causing a partial vacuum, and probable collapse of the cylinder.

This action may also occur if a non-return valve is fitted on the expansion pipe outlet—a bad practice, but sometimes done to prevent air being sucked in when a hot tap is opened. In this case it may happen when repairs are being carried out, and the cyclinder being drained, with the cold feed valve shut. The remedy in all the cases mentioned is to make certain that the expansion pipe is clear and open to the atmosphere.

Cases of collapse due to air lock are usually confined to old lead jobs where the lead has sagged and formed a trap —for instance, where a pipe changes direction from horizontal to vertical (Fig. 2), or where lead pipes were laid over joists without providing a support board. This allows air, released from the heated water, to collect at the crown of the dips.

It is very difficult to shift this air bubble by ordinary means, as until the head on the one side of the dip exceeds the head on the other side by a height greater than any depression in the main horizontal run of the expansion pipe, this air cannot be expelled.

This means that a virtual block exists and may cause a situation to arise as earlier described, so that when a hot tap near the cylinder is opened, collapse will occur This air lock may also reduce or completely stop the flow of water.

The traditional way to remove air locks of this type is to connect the cold water (pressure) tap over the kitchen sink to the hot water tap by means of a rubber hose, thereby allowing the high-pressure water to enter the system and blow out the imprisoned air through the expansion pipe. If a loose washer or jumper is in the hot tap—as may happen in old systems—it must be first removed, otherwise it would press on its seating and prevent the inflow of the cold water.

Boiler noises

THESE can vary from small rumblings to a continuous tapping which may penetrate throughout the house. It is often very difficult to find the cause of these noises—in one case it was traced to a plug of paper which the plumber had put in when soldering the dip pipe and later forgot to remove!

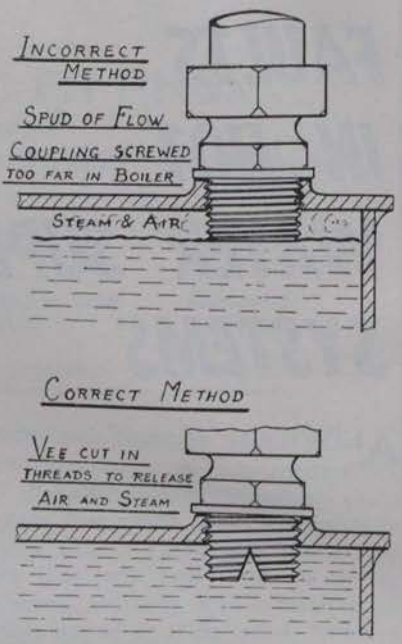

FIG. 3

Noises can be due to sediment or foreign matter in the boiler. Sometimes the sound will provide a clue—e.g., a rather muffled noise where sediment is present, and where scale from lime deposit is present a tapping or cracking noise may result.

In the latter case, if methods are not adopted to prevent this scale formation, the cracking of smallpieces from the deposit will later lead to large pieces of scale being forced off by steam pressure behind the cavities and loud explosive noises resulting. Eventually, if the flow and return tappings get choked, a final explosion will complete the matter.

A complaint is sometimes made of rushing noises and hammering in the circulation pipes. This is usually due to steam formation between the water and the boiler plates, so forcing a steam-water mixture up the pipes—principally the flow pipe. When the steam comes in contact with cooler water or a cooler pipe surface, it will condense suddenly and the water will be forced into the resulting vacuum with great speed and noise. This trouble may also be due to the projection of the flow coupling on a top inlet boiler into the water space, so preventing the boiler filling completely (Fig. 3).

Creaking noises may also develop from the circulation pipes and are usually traced to the rubbing of the

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APPLICATION

THE WEATHERING OF BUILDINGS

DAMP buildings are cold and unhealthy; moreover, dampness will hasten the decay of timber and other building materials to such an extent that the useful life of the building will be seriously reduced. Thus, the exclusion of dampness is an essential part of good building work, and one in which the plumber is directly concerned.

There are many ways in which damp may enter a building, all of which should be looked for if one is called to investigate trouble of this sort.

- Damp might enter in the form of moisture rising through porous walls or floor materials which are in contact with damp ground. Special waterproof membrane (damp proof courses) are used in good new work to prevent this.
- The condensation of atmospheric moisture on cold, non-absorbent internal surfaces can give rise to serious dampness. There is little that the plumber can do about this except advise the client to provide more ventilation to the room or building.

The alternative, though this is, of course, more expensive, is to apply more heat to the room. By this method, either the temperature of the air will be raised to above the point at which its moisture condenses out, or the temperature of the walls will be raised so that local cooling of the air in contact with them is avoided.

- Dampness in the form of rainwater may penetrate through walls, through projections from walls, or through faulty weatherings where walls and roofs meet. All weatherings should provide properly fashioned and fixed metal coverings at these points.
- Dampness in the form of rain or snow may penetrate through the roof covering. In the case of roofs covered with metal, this may be due to faulty design of roof weatherings, defective workmanship, or defective materials.

Roof structure

ROOFS may be either pitched or flat. A pitched roof is one which slopes at an angle of more than 10 degrees to the horizontal plane. It may be "double pitched," so that from an end view it looks like a "V" turned upside down; or it may be "mono-pitched," with only one sloping surface.

A flat roof is one with a pitch of less than 10 degrees, but generally a "flat" roof is understood to be one which falls or slopes only enough to drain off rainwater. Such falls are usually about 2" in 10' 0".

The substructure or framework and decking for these roofs may be of timber, the size and strength of which will be designed to carry its proposed covering plus an allowance for the pressure and suctions effects of strong winds. A flat roof substructure might be of concrete.

The design and preparation of any roof substructures which is to have a metal roof covering is very important. Faults in design or careless ness in preparation of the decking cannot be put right once the metal is laid, but they can seriously affect the efficiency and durability of the metal coverings.

Many roof designers are wise enough to get special advice, so that these faults can be avoided. Unfortunately, this is not always the case and the plumber often meets roof preparations which are clearly unsuited to the metal that has to be put on it. In such cases one must hope to convince some responsible person as to what should be done to put things right before work is started. This needs a great deal of tact, but the plumber would be failing in his duty if he did not attempt to have these important matters dealt with.

Points to look out for:

1. Timber deckings to support sheet metal roof coverings should be of well seasoned tongued and grooved boarding at least 1" thick.

2. It is false economy to use cheap boarding, and wherever possible the boards should be selected so that warping will be reduced. The boards should be laid "heart" side uppermost, so that if warping does occur no sharp board edges will turn up to cut the metal roofing.

3. On flat roofs the falls must be sufficient, and 2" in 10' 0" is considered just right. To allow more is unnecessary and expensive, since more timber is needed to provide the "furring" pieces which tilt the boarded surface. To allow less will result in poor roof drainage, and might cause leakage at joints.

4. Boarding must be laid in the direction of, or diagonal to, the fall.

continued overleaf

FACULTY OF PLUMBING . . . A. L. Townsend, M.R.P., M.R.S.H., a Lecturer at the Oxford College of Technology continues here the first part of a four stage course in plumbing. The author has closely followed his own lecture programme and has paid particular attention to scientific and technological innovations.

from previous page

5 All nail heads must be punched below the surface of the boards.
6. All sharp edges of boarding with which metal will come in contact must be rounded off slightly with a plane or rasp.
7. "Box" gutters, which collect the rainwater from the flat roof before it is discharged to the rainwater pipes, should be wide enough to allow even a big footed plumber to walk along with ease. 9" should be regarded as a minimum width, but 12" or 18" is better from the practical point of view; it will help the laying of the metal gutter linings, and their subsequent cleaning and maintenance.

Metals conduct heat and by themselves metal covered roofs are poor heat insulators.

Felt underlays of flax fibre soaked in bitumen offer some measure of heat insulation, and should be laid butt jointed on roof deckings before any metal sheets are laid.

The felt is generally known as inodourous felt No. 1. It is brown, "hairy" in texture, a little over $\frac{1}{8}$" thick, and supplied in rolls.

The chief purpose of the felt is to act as a heat and sound insulator, but it has other useful properties; the fact that it insulates heat reduces the effect of wide temperature variations. Furthermore, it reduces the damp and possibly corrosive results of condensation on the underside of the metal roof coverings. On boarded roof deckings the felt also acts as an insulator of sound, and helps to deaden the drumming noise of heavy rainfall.

Metals are liable to corrosive attack when in contact with some timbers, notably oak; concrete, and, particularly, breeze concrete. The felt underlay "insulates" the roofing metals from the substructure, and so removes this risk of corrosion.

Finally, the felt does smooth out minor imperfections and roughnesses in the timber or concrete substructure surfaces, and so helps the metal to expand and contract freely.

It has already been said in an earlier article that a large roof area must not be covered with a single sheet of metal, but divided up into a number of smaller bays in order to allow for the movement of the metal caused by thermal expansion.

The fixing and jointing of bays forming a roof or gutter needs great

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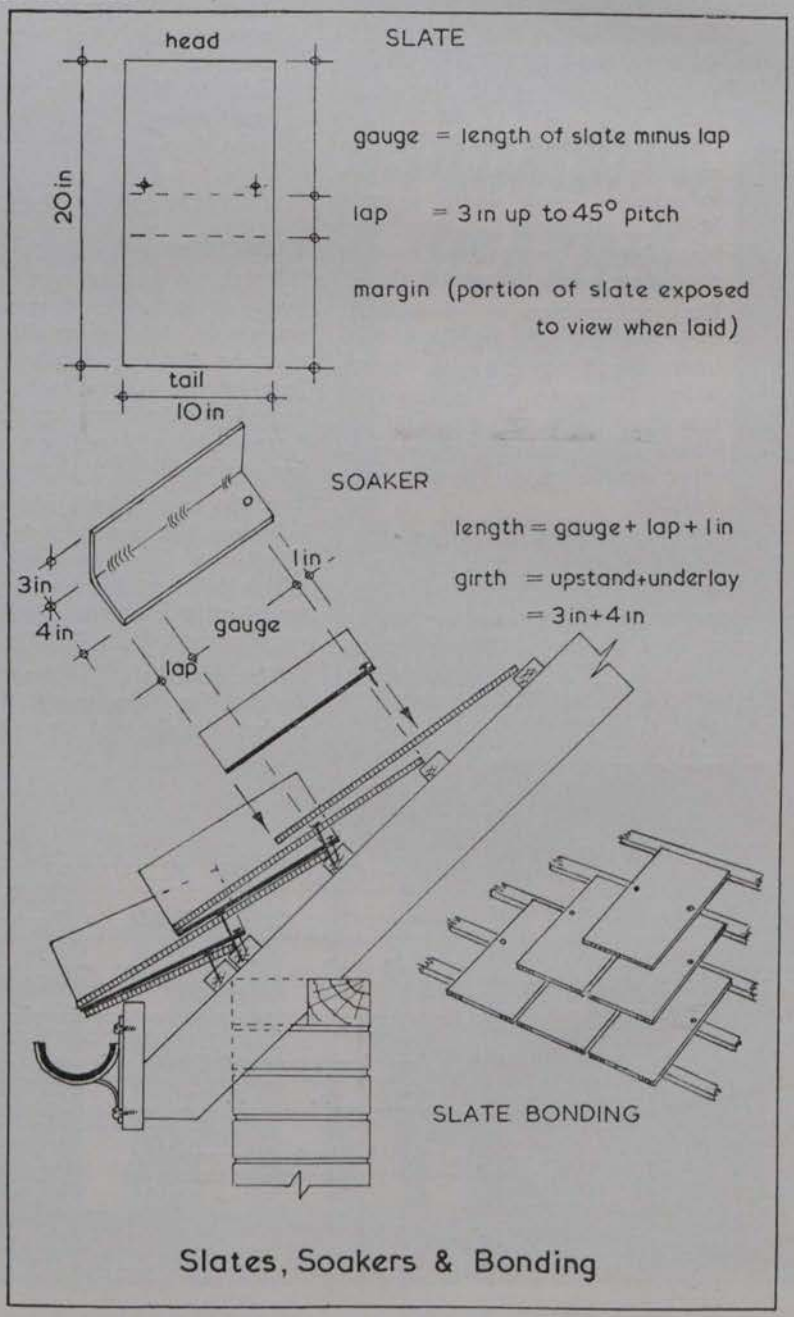

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THE IRISH PLUMBER & HEATING CONTRACTOR

IRISH TRADE AND TECHNICAL PUBLICATIONS

DECEMBER, 1961.

Dear Reader,

You will, I feel, welcome the news of the continued expansion and success of the Irish Plumber and Heating Contractor. For, in the New Year the Contractor will be extending its field of coverage to the north of Ireland where hundreds of new readers will get the journal every month.

Since its introduction less than a year ago we have been more than pleased with the reception given the Contractor by yourself, the reader. We have now fully satisfied ourselves that the journal has established itself as an integral part of the trades it serves.

This latest expansion of the Contractor will see a further widening of its field of influence and is in keeping with the prime aim of the publication—to provide an efficient, active, and complete service.

I should very much like to take this opportunity of wishing you a Merry Christmas. In the New Year we wish you happiness and prosperity.

And, as we say—Go mbeimid beo ar an am seo aris.

Yours very truly,
IRISH TRADE & TECHNICAL PUBLICATIONS

G. James Murphy.

G. James Murphy,
Publisher.

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UNIDARE INTRODUCE THREE NEW TERRAIN SYSTEMS TO TRADE

BY A CONTRACTOR REPORTER

UNIDARE LIMITED, at a trade show and press conference last month, announced the introduction of three new Terrain systems which, they claim, will bring about revolutionary changes in the building trade. The three systems are:—

- Warm air heating and ventilation.
- Roof drainage.
- Soil and waste drainage.

These three systems, based on the use of unplasticised, unmodified P.V.C., were designed by Unidare's Associates, Messrs. A.B. Plastics Ltd. of Kent, who first introduced them on the British market in May, 1961. The various moulded fittings will continue to be imported into Ireland for the present, and Unidare Limited will produce the extrusions.

Looking at the Terrain warm air heating and ventilation system, it is worth noting that this system of unmodified, unplasticised P.V.C. ventilation ducting, is the latest development in the fabrication and installation of ducting.

Thick sheeting

Many plastic ventilation systems are, of course, manufactured from thick sheeting, hot-welded. Terrain ducting is made from these (one-sixteenth and one-eight) hard P.V.C. sheets fabricated by using extrusions, cold welded with solvent, so as to form the required sections.

Method of Assembly: The jointing of Terrain sections, one with another, is extremely simple in that the ends are just pushed together. This is made possible by attaching a piece of foam plastic to the plain end of a duct which is then pushed into a section extrusion fixed to the other end of the next duct. This arrangement ensures a perfect seal and also acts as an expansion joint.

The factor of corrosion resistance makes Terrain of particular interest, not only to the chemical industry but to schools and for laboratory work. The upper temperature limit of 140°F normally gives sufficient latitude for most installations.

In the Terrain soil and waste drainage system the fittings used are of the "all socket" type; this permits the use of plain ended pipes, which may be cut and used in any length without waste.

Close tolerances

The method of jointing is by solvent welding and to facilitate this technique, the pipes and fittings are made to very close tolerances (± 0.005").

The sockets of the fittings are tapered and the pipe is made slightly "over-size" so that an interference fit is obtained.

The extremely smooth nature of the pipes and fittings and the corrosion resistance of the material, prevents erosion of, or accretion on the bore, thus maintaining the maximum performance of the installation. Because of the swept configuration of the Bends and Branches, together with the perfect alignment and smoothness of the bore, there are no sharp projecting edges or "steps" which are frequently the cause of blockages with conventional materials.

The upper temperature limitation for the use of this material is considered to be between 140/150°F.

Access door

An important innovation in the Terrain system is the Access Door, which can be fitted to the pipe or the straight portion of a branch and is easy to remove for inspection of the interior of the pipe or fitting, or to clear an obstruction. The door consists of two parts permanently connected by a strong circlip and fastened with a cadium plated screw. The inner part of the door, which has a tapered edge, is inserted inside the pipe hole by a twist of the hand. The central screw is then tightened to draw the two halves of the door together to ensure a perfect closure.

The tapered edge of the inner door, with a rubber washer on the outer portion of the door, together form a seal which keeps the bore smooth and gives an air-tight seal.

The Terrain system has also been designed to permit pre-fabrication of various sections of pipe work in hotels, flats or multi-storey office blocks where lavatories, wash basins and anti-syphonage pipe work are exactly repeated on each floor.

Systematic

Terrain P.V.C. Roof Drainage System represents the systematic approach. Of particular interest is the design of the components, which have been made, not as slavish copies of conventional units, but to take full advantage of the special properties of unplasticised P.V.C.

Ten basic units comprise the Terrain range; and these ten combine maximum efficiency with minimum cost of erection. Gutter and Down Pipe is supplied in straight, plain lengths without sockets. This enables any length of Gutter or Down Pipe to be cut without wastage of material.

Terrain gutter is 4 inches deep, half round, having a flow capacity of 11 gallons a minute when laid level and 15½ gallons a minute when laid to a fall of one inch in 50 ft.

The new systems were also introduced to the trade at showings in Cork, Galway and Limerick.

Held over

Because of pressure on space this month we have been obliged to hold over until the January issue, Mr. Coyle's sixth article on Plastics in Plumbing.

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DOI: 10.21427/D78T5V

NEW £250,000 SANITARY WARE FACTORY FOR ARKLOW

THE establishment of a new £250,000 sanitary ware industry in Arklow was anonunced earlier this month by Mr. David Coyle, Chairman, at the annual meeting of Arklow Pottery Limited in Dublin. The new industry would be so up-to-date that it could meet open competition, he said.

The Italian ceramic organisation of Richard-Ginori (Milan) are to be associated with the venture. It is hoped that work will begin on the erection of the plant in the New Year.

Here is what Mr. Coyle told the twenty-seventh ordinary annual meeting:—

"Last month we registered a company under the name Sanware Ltd., with a capital of £250,000 for the manufacture of sanitary and other ceramic wares.

"Two years ago I reported the possibility of another ceramic industry to be started in Arklow under our control. Two months ago this was brought to a successful conclusion when I visited Milan with your Director, Mr. Callanan, and our General Manager, Mr. Ryan. In Milan we signed an agreement with the great Italian ceramic company of Richard-Ginori for the planning and erection of a very modern factory for the manufacture of sanitary ware in Arklow.

"In addition they will train workers for us; supply us with designs and moulds; give us all necessary technical help and advice; and send experienced helpers on loan to Arklow if required.

"I record with appreciation the help and advice and courtesy we received from the Minister for Industry and Commerce and his Department; from the Industrial Credit Co., and from the Industrial Development Authority, which was so important and vital in bringing this industry to Ireland.

"This is possibly the first important or major Italian industrial concern to take a practical and positive interest in helping industry in Ireland. I am happy to be associated with you in such an important pioneer event in our Irish industrial history.

"Italian designers and shapes are very advanced. They have earned a high prestige value on merit and are sought after by popular and artistic taste in many countries. In addition our sanitary ware will be made of vitreous china, which is modern and best for hygienic use, and bright in appearance and practical in finish."

TENDERS

CORPORATION of Dun Laoghaire.—Tenders for the Erection of New Bathroom Accommodation at Nos. 1-18 Upper Dale View, Ballybrack, Co. Dublin.

Tenders are invited for the above. Specification, Drawings and Form of Tender may be obtained from the Town Clerk, Town Hall, Dun Laoghaire. Conditions of Contract may be inspected at the Town Hall, Dun Laoghaire, during office hours. Tenders, in sealed envelopes, endorsed "Tenders for New Bathroom Accommodation at Nos. 1-18 Dale View, Ballybrack," will be received by the Town Clerk up to, but not later than, twelve o'clock noon on Wednesday, December 20, 1961.

CAVAN County Council.—Kilnaleck Sewerage Scheme. Tenders are invited for the construction of the above Scheme in accordance with the Plans, Specification, Conditions of Contract and Bills of Quantities prepared by Mr. Edward G. Pettit, B.E., M.I.C.E.I., 7 South Mall, Cork, from whom copies of the Contract Documents may be obtained on deposit of £15. The work comprises the laying of approximately:—

1,328 L. yds. of 6" Sewer.
660 L. yds. of 9" Sewer.
95 L. yds. of 12" Sewer.
177 L. yds. of 4" Rising Main,

including all necessary manholes and ventilating columns and the construction of an Ejector Station and Disposal Works consisting of Preliminary Units, Imhoff Tank, Dosing Chamber, Filters, Humus Tank, Sludge, Drying Beds and Ancillary Works.

Sealed tenders, accompanied by Bills of Quantities, priced and extended in ink, should reach the undersigned not later than 5 p.m. on Thursday, January 11, 1962.

Notice To Pump Manufacturers and Agents.—Tenders are invited for the supply and installation of No. 1 Compressed Air Ejector together with all valves, fittings, motors and compressor units in accordance with Specification prepared by Mr. Edward G. Pettit, B.E., M.I.C.E.I., Consulting Engineer, 7 South Mall, Cork, from whom copies of Documents may be obtained on a deposit of £5. The Ejector shall have a capacity of 33 gallons per minute. Tenders, in sealed envelopes endorsed "Tender, Ejector Plant, Kilnalec Sewerage Scheme," should reach the County Secretary, Courthouse, Co. Cavan, not later than 5 p.m. on Thursday, Jan. 11, 1962.

SLIGO County Council. — Ballymote Regional Water Supply System (Filter Plant). Tenders are invited for the supply and installation of a complete Water Filtration Plant having a capacity of 12,300 gallons per hour in accordance with contract documents prepared by Messrs. Nicholas O'Dwyer, Son & Partners, Consulting Engineers, 6 Burlington Road, Dublin, from whom documents can be obtained on payment of a deposit of £10 10s. 0d. Tenders, on the form provided, with Summary priced and extended in ink, should be submitted in a sealed envelope, endorsed "Ballymote Regional Water Supply Scheme—Filter Plant," so as to reach the Secretary, Sligo Co. Council, Courthouse, Sligo, not later than 5 p.m. on Thursday, January 11, 1962.

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care, since the fixings for the metal must be secure whilst at the same time allowance is made for its free expansion and contraction. This freedom of movement is provided for in the design of bay joints and the style of working the different metals at these points.

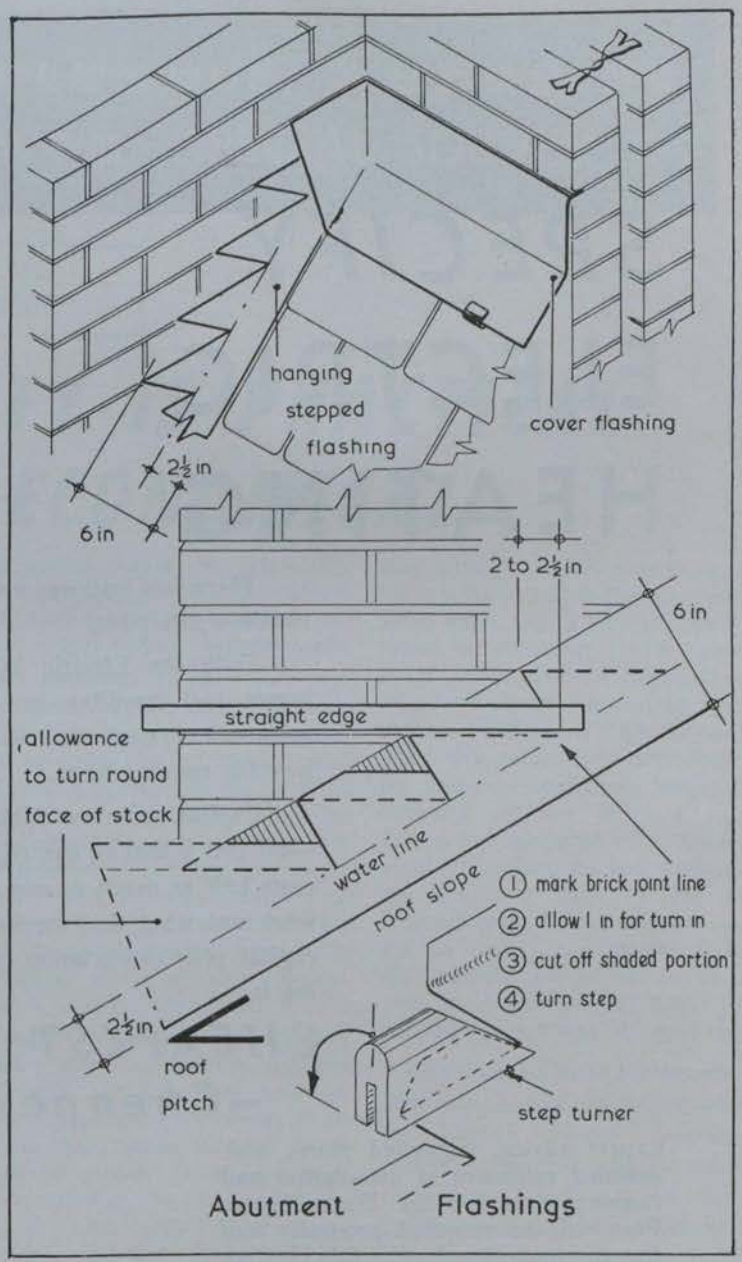
Fixings must provide for free movement of the metal sheets in at least two directions, and this means that no area of metal should be permanently fixed at opposite ends. To do so would result in the metal rising up in the middle when hot and falling flat again when cool. Continuous movement of this kind would cause the metal to get "tired" or fatigued, and split. This will be dealt with in detail later.

The lighter materials, copper, aluminium, and zinc, require special care in fixing since they are more likely to "lift" to the suction effect of strong winds.

Capillarity: Capillary attraction is the well-known phenomenon which happens when water appears able to rise above its own level, either between two surfaces that are close together, or through fine bore, tube-like passages such as are found in some building materials. Capillary attraction accounts for the fact that dampness will rise up walls from the ground. It can also work in reverse, so that when dampness appears at ceiling level in top floor rooms it is because of the downward passage of water through chimney and parapet walls.

Damp proof courses of some material through which water cannot pass are placed at suitable levels in the walls of buildings to prevent these upward and downward capillary movements. Lead, copper, and aluminium foil sandwiched between two layers of bitumen are often used for this purpose; and chimneys are sometimes built with damp proof courses in line with the roof slope and a little below it, or at a horizontal level just below the point where the chimney stack begins to pass out of the roof.

Capillarity can also cause rainwater to enter joints in metal roof coverings unless suitable precautions are taken. Capillary attraction lessens as the gap between the two surfaces gets bigger, and if the gap is wide enough it will stop. The insertion of a gap between two surfaces fixed closely together will prevent capillarity.



Roof weathering details

SLATE sizes are known by female titles of rank. A "Duchess" slate is 24" long and 12" wide; a "Countess' 20" by 10", and a "Lady" 16" by 8".

Slates are fixed to 2" x 1" slate battens with two stout, large-headed slate nails. These are placed a little above the centreline of the slate, and about 1¼" in from each side. This arrangement is called "centre nailing" and is generally used because it holds the slates more securely against the wind than does "head nailing," where the nails are fixed at the top corners of the slate.

Slates are fixed in rows or courses along the roof beginning, as with all roof weathering work, at the lowest point of the roof. In this case it is the eaves. Each course overlaps parts of two courses below it.

Note carefully that the top edge of the fascia board is higher than the top line of the slate battens. This causes all the slates to tilt instead of lying flat. The tilt of the under slates makes the tails of the centre nailed upper courses press down on those below. This helps to keep the slates

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DOI: 10.21427/D78T5V

AN IRISH PLUMBER & HEATING CONTRACTOR SPECIAL SURVEY

ELECTRIC HEATING SYSTEMS, APPLIANCES AND CONTROLS

ELECTRICITY IS PRACTICAL AND ECONOMICAL

THE function of a space heating system is to provide acceptable levels of physiological comfort conditions for those occupying the heated space.

Heat emission to the spaces to be warmed may be **mainly convective** and employing natural convection heat transfer in air, or by fan assisted convection with its advantageous quicker response to control. **By radiation**, a form of heat energy transmission by wave motion similar to light transmission, which is independent of air temperature of motion, or a **combination** of both.

As to which emission method predominates, the choice will be determined only after careful consideration of many factors. Space does not permit elaboration of these in detail but the following indicates some of these factors.

The building's function—i.e., does it call for continuous heating or would intermittent heating provide the desirable comfort conditions more economically.

Rate of air change required to serve some other specific function; for example, an adequate supply of fresh air is clinically essential as a medicament in the treatment of some chest ailments. A ward in such a clinic would therefore have adequate window openings and clearly any form of convective heating would be wastefully wafted away and some form of radiant heating would be recommended.

Schools and other **intermittently occupied buildings** or rooms do not call for space heating during periods of non-occupancy. The virtually immediate response of electrically heated radiant panels, possibly in the form of electrically heated ceilings, might be used. Alternatively, the relatively low specific heat of air enables this to be warmed quickly, and employing electric heated fan assisted convectors, the space may be quickly filled with all pervading warm air and comfort conditions quickly established.

The degree of structural insulation provided.—Warm air heating contacts internal wall surfaces and tends to raise the temperature of these. In such cases, heat losses through structure will be greater as the thermal insulation value of the structural parts is reduced. Generally, a high degree of thermal insulation improves the comfort condition within any building and reduces the capital and running cost of the heating system, which might be convective or radiant, continuously or intermittently operated.

Thermal capacity of the structure relates to the heat retaining properties of the walls, floors, etc., and must not be confused with thermal insulation. A modern wall cladding system may have much less heat capacity yet have a much better thermal insulation value than, say, a wall of more traditional construction. The important point about thermal capacity and its effect on choice of heating system is that, a building of high thermal capacity will retain heat absorbed from the emission appliances longer than a building of low thermal capacity. Internal temperature fluctuations would therefore be less noticeable in the first case than in the second. Consequently, fluctuations in heat output to space, in intermittent heating for example, would not be so noticeable in buildings of high thermal capacity as in those of lower capacity.

Important as these factors are, since they will largely determine how well the heating system functions, if properly designed and installed with these accounted for, the following factors will also be important to the client who will have to finance the scheme:—

The capital cost of the heating plant and installation; running cost; maintenance cost; cleanliness and convenience of operation; and facility of control for comfort and fuel economy.

continued overleaf

This special survey—the sixth in a series on important aspects of the plumbing and heating trades—has been compiled by technical expert A. L. Townsend, M.R.S.H., M.I.P.

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Electricity offers a practical and economic solution to the majority of all these factors.

Even the question of running costs, a sore point with many in the past and subject of much ill-informed argument even now, becomes increasingly more defensible as other fuel prices rise whilst the electricity tariffs remain reasonably stable.

The economics of space heating are rightly considered important factors in choice and extent of heating design. It is, however, wise when dealing with a prospective client to weigh the economic merits of lower capital cost of electrical heating; the practically non-existent maintenance cost; the reduction of costly structural work in flues and fuel stores, and the avoidance, in most cases, of wastage of valuable floor space to floor standing emission appliances of other kinds, when offering heating schemes for consideration.

Accepted the advantages

The remarkable growth of electrical heating does, however, reveal that many have accepted the advantages it has to offer.

In the U.S., where electric space heating has been promoted for several years, there are now over one million electric heated homes and it is forecast that this will increase to five million by 1970.

Nearer home the application of electric heating by farseeing designers show comparable growth.

Electric heating appliances or installations may be classified as follows: (1)—**Thermal Storage** applies when a large body of material of high thermal capacity is heated during " Off Peak " periods, usually 7 p.m. to 7 a.m., and the heat so stored is subsequently emitted to the spaces to be heated during the following day. Electricity is not consumed during the actual, useful heat emission period and for this reason such systems are sometimes referred to as **" indirect " systems.**

Thermal storage systems may be further sub-divided as follows:—

(i) **Thermal storage in water.**—In this case a large volume of water is heated in heavily thermal insulated storage vessels. The prime heat source is an electrode boiler. Current flows through the water from the " live " to neutral electrodes and by virtue of the electrical resistance of water, heat is produced by this current flow. The heated water is passed to the thermal storage vessel from whence it is circulated by way of blending valves through low pressure hot water emission systems of conventional type.

Sufficient pressure

The stored water is heated to above 212°F and suitable elevation of feed cisterns is necessary to impose sufficient pressure to prevent steaming. Where sufficient head is unobtainable " artificial " heads are produced in some form or another. The temperature to which the stored water is heated is related to the quantity of water so heated and in such manner that the total heat content after charge, is at least equal to the heat load of the building for the whole period during which no electrical energy is applied to the electrode boiler.

This arrangement is a highly specialised one. The equipment is costly, and using conventional L.P.H.W. heat emission arrangements, the installation will prove more costly than a similar installation having an alternative fuel firing a direct heating boiler. Certain specific building, or site conditions, may, however, warrant consideration of such plant.

(ii) **Thermal Storage in Structure.**—Electric floor warming is a typical example of this type of system. In this case " Off Peak " current is passed through electric cables within the high thermal capacity concrete floor slab during the night and is liberated to the building during the day. The old dodge of bed warming by heating a brick in the oven before wrapping it and placing it in the cold bed, is an example of this principle.

Electric floor warming provides for economic and fully automatic heat input to a large mass of material—the concrete floor, at a relatively low temperature. The heat holding capacity of the material must be such that it will store sufficient heat to satisfy the heating load of the building during the day when the current is switched off by the Electricity Board's sealed time switching apparatus. In the interest of fuel economy careful attention must be paid to sub-floor thermal insulation. D.P.C. membranes as vapour barriers to prevent rising moisture, and edge insulation to prevent heat leakage from the floor slab to external walls, etc., is necessary, though not costly to install.

Radiant heat is emitted from such warming systems and with a floor surface temperature at 75°F, the generally accepted maximum, a temperature gradient floor to ceiling will be virtually constant at about 62°F at one foot above the floor and right up to the ceiling. Thus one feels the sensation of warm feet—cool head, a condition most conducive to full environmental comfort so far as heating is concerned. Furthermore, since radiant heat does not appreciably warm the air through which it passes, it follows, as the temperature gradient reveals, that one can be comfortably warmed by radiant heat, in a lower air temperature than would be desirable with convected warm air heating. This being so, the structural heat losses are usually much less with radiant heating of this kind than with warm air heating.

Thermostatically controlled

Automatic heat input to floor slab may be thermostatically controlled though there can be no effective control over heat output. For this reason some argue the system to be conducive to waste of fuel and claim that heat will be emitted from the preheated slab even if not called for on a following mild day. It should be borne in mind the heat transmission varies as the temperature of the bodies between which transfer takes place varies. Consequently, emission from the heated slab is reduced as air and structure temperatures rise in milder periods and the heat thus retained in the slab reduces the subsequent electric input to bring it to full capacity on the next re-heat cycle.

Electric floor warming becomes increasingly popular for continuously

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heated homes. The concrete floor slab is an essential component and so the system is restricted to two-storey houses of normal first floor construction. It can, of course, provide full space heating for bungalows.

The three kinds of floor warming systems are:—

(i) **Withdrawable.**—In this case the electric resistance wires which pass through the floor slab are drawn into patented, previously laid, metal ducts of quite small size. Access to cable ends is provided by larger ducts with liftable covers provided at strategic positions along the end or side of a room. Such systems offer complete access for renewing any cable should it develop a fault.

(ii) **Re-wireable.** — These too offer facility to re-place cables in the unlikely event of breakdown. In this system the plastic insulation of the heating cables is a little larger in bore than the O.D. of the cable itself. A main cable duct is provided but this is normally covered in with adopted floor finish and its position noted. In event of need to renew a cable, the fault would be detected, and faults can be traced to within an inch or so of their location, the floor opened up at convenient points in two small areas at each end of the cable run, the defective cable removed, a new one threaded in and coupled to existing cables, and the floor re-instated.

(iii) **Non-rewirable.**—In this case no provision is made for cable replacement and in consequence this system is the cheapest of all to install. In the unlikely event of a fault development this can be located easily and quickly, the floor opened at that point, a repair effected and the floor surface replaced.

Loadings vary according to the heat requirement characteristics of the room but an allowance of 10 to 15 watts/sq. ft. of floor are not uncommon.

Running costs will depend so much upon local factors and electricity charges but on average current consumption might vary from 1.2 to 1.5 units per 1,000 watts installed.

Documented evidence of a twelve month survey on the Kirkaldy flats indicates the following running costs as average: 10/9 per week for two rooms and 14/3 for three rooms heated by this means.

Thermal Storage Heaters are free standing, floor mounted appliances containing a large mass of refractory material as the heat store reservoir. Though this mass of material electric resistance wires are threaded so that during "Off Peak" charging periods these wires heat the refractories to considerable temperature. In this way a large amount of heat is stored at relatively high temperature in a relatively small space and this, though the same in principle, is opposite to the operating conditions obtaining in floor warming. Input heat is controlled by integral control devices and to ensure correct rate of heat dissipation during emission periods, the heated refractories are enclosed in thermal insulation fitted between the refractory mass and the pleasantly styled outer casing.

Shops and factories

Such appliances find use in shops, factories and similar establishments. They are available in various loadings but 3kW seems a popular size, and these are about 32ins. high x 32ins. wide x 12ins. deep. A domestic model recently on the market has variable effective load of 1 to 2½kW, and has dimensions 31ins. x 22ins. x 12ins. Cut out links are provided to safeguard against overheating on prolonged charging times.

The weight of the heat storing mass of refractory blocks must be considered when installing appliances of this kind. A 3kW model will weigh something approaching 5 cwts. Manufacturers will advise as to suitable supporting instructions when the floor construction is stipulated.

(2) **Direct Heating Appliances** consume current as the heat energy is emitted. In other words direct heating appliances are of the **non-storage** kind. Direct Heaters may be of the mainly radiant or mainly convective kinds whilst all will exhibit both radiation and convective emission com-

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● *In conjunction with this special survey on oil fired heating systems, appliances and controls we review products from the leading manufacturers' ranges.*

VALOR fluid-filled thermostatically controlled electric radiators provide the advantages of central heating merely by plugging in to a suitable electric point.

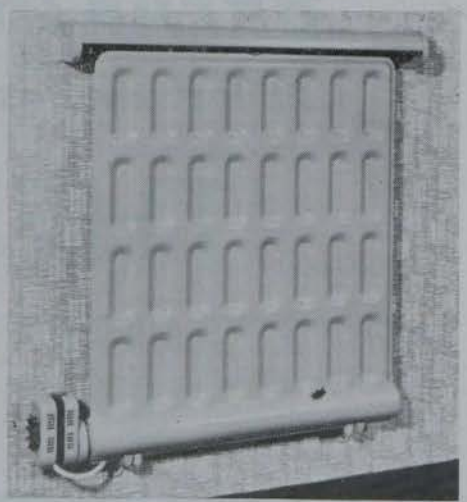
Thermostatically controlled, the radiator only operates should the room temperature fall below the desired level.

A built in safety device provides a safeguard against overheating. The heating element and fluid are permanently sealed, and no topping up is required. Wall fixing brackets, top plates and castors are available. Voltage: 240v. (A.C.). From the Valor Company Ltd., Bromford, Erdington, Birmingham.

★ ★ ★

"DIMPLEX" electric convectors provide quick background heating on a broad front. They are available in two sizes—2ft. (300 watts) and 3ft. (500 watts). They can be used as "floor standing portables" (supplied with feet) or for mounting onto the skirting boards or walls.

Dimensions range from 24" to 36" long, 5" to 7¼" high, and 2½" to 4½"



deep. The manufacturers are Dimplex Ltd., Millbrook, Southampton, and the Irish agents are A. Bell & Co. (Eire) Ltd., Rear 136 Botanic Road, Glasnevin, Dublin.

Illustrated here is the Dimplex permanently oil-filled thermostatically controlled electric radiator, model B.48 (750), wall mounted and fitted with a top plate.

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DOI: 10.21427/D78T5V

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ponents in ratio according to the type and placing of the appliance.

Electrically Heated Ceilings are a comparatively recent innovation. These dispense radiant heat over a wide area. In this respect they are similar to the overall warm emitting electrically heated floors but there the similarity ends.

Heated ceilings do not store heat. Being direct heating systems they emit heat as soon as they are switched on and cease to give heat as soon as switched off. This is one advantage offered by this system—it is decidedly flexible in control. They cannot, however, take advantage of cheaper "Off Peak" tariffs. Suspended below structural upper floors, these heated ceilings comprise a suitably supported electric resistance cable wound serpentine fashion. Above this is placed a thermal and accoustic insulating material to reduce heat losses to above and, incidentally, to improve the accoustics of the room. Below the resistance cable are fitted pleasing looking tiles which become heated and, in turn, emit the radiant heat downward.

Operating surface temperatures

Mineral insulated cables acquire a temperature of between 200 and 300°F, resulting in ceiling surface temperatures of between 90 and 100°F. Operation can be by manual switching or by thermostatic control.

Radiant Panel Heaters may be classified "High Temperature" or "Low Temperature" according to the operating surface temperatures. "High Temperature" panels operate at about 400°F and would be suspended, out of reach, and possibly at an angle so as to direct its radiant heat toward environment level. Used with an awareness of the uni-directional radiation projection of these flat surfaced panels they can provide useful heating elements. Low Temperature panels have maximum operating surface temperatures in the order of 180°F. They can therefore be placed much as hot water radiators might be, along a wall in similar manner to panel type radiators.

"Infra Red" Suspended Radiant Heaters offer a recent improvement on the older, well tried exposed element

continued overleaf

THE NEW G.E.C. "California" air conditioning unit with a 2Kw element controlled by sensitive thermostat, adds warmth in winter to fresh filtered air. The nylon mesh filters lift out easily for washing and the front panel unclips to provide access to all components.

An aperture only 32" x 16¼" in a wall, a convenient electrical power point, and a narrow strip of floor space are all that are needed to install the unit. Dimensions are: height, 30"; depth in room, 10"—overall, 14½"; width, 33".

A fully hermetic refrigeration system—sealed for life—is incorporated. The unit is fitted with automatic thermostat, true 50 or 60 cycle compressors, with power factor compensating capacitors.

The G.E.C. Storage Heater meets the safety requirements of the Electric Development Association, consumes little current for its heat output and is completely reliable. One Kw, £10 18s. 0d.; 1.5 Kw, £11 18s. 6d.; 2 Kw, £12 19s. 6d.; 3 Kw, £15 11s. 6d. each, complete with switch.

★ ★ ★

THE Satchwell Ratiomatic is a new control system for the automatic regulation of the duration of charge supplied to a domestic electric underfloor heating system during an off-peak period.

The Ratiomatic consists simply of two thermal units, one mounted outside the house and the other inside. These units in combination, according to the temperature they measure, provide a switching cycle, the ratio

of "ON" to "OFF" periods which governs the charge given to the floor.

The Ratiomatic is simple to install and since only three wires are required to connect the outside unit, there is complete freedom to fit it in the most convenient position.

Ronald E. Ayers, Esq., Graystoke, Nashville Road, Howth, Co. Dublin, is the Irish agent for the manufacturer, The Rheostatic Co. Ltd., Slough, Bucks., England.

★ ★ ★

ELVACO Heating Limited, Vineyard Works, Lancaster Park, Richmond, Surrey, are concessionaires for the Danish Elvaco system of controlled electric heating and ventilation. It is understood that an Irish agent is soon to be appointed for the distribution of the system in this country.

The Elvaco system is based on a slow and controlled air flow ensuring

E.S.B. WARM HOME PLAN

ALREADY well-publicised and reviewed in the Contractor, the E.S.B. Warm Home Plan needs no introduction.

The plan has been designed to provide overall house heating for the average home and can now be installed, say the E.S.B., for about half the cost of conventional central heating.

Since its introduction last year the plan has been well received. It uses simple heating units and can be adapted for old or recently built houses and readily installed in dwellhouses at the blueprint stage or while under construction.

For existing houses the plan provides for the use of electric storage heaters in living-rooms, hall and kitchen, and for bedrooms in both new and existing houses and a choice of wall-mounted convectors, tubular heaters or infra-red heaters is provided to give overall warmth.

In the case of new homes, electric floor-warming is suggested as an alternative to storage heaters.

In both new and existing homes the roof space is insulated, and in either case there are no expensive structural alterations.

Example: Electric central heating can be installed throughout a three-bedroomed house for £140.

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radiant heaters of this kind. Housed in a casing resembling fluourescent light tube housings, these appliances are very useful in the home, factory, office or shop; indeed, in any position where economic, trouble free local heating is required where it would be too costly or unnecessary to heat the whole space.

The older type is still available and is still quite suited to the purpose outlined above. Its element is a mineral insulated and metal sheated, hence only a faint glow when operating. The newer " Infra Red " types have a spirally wound element within a silica tube. These are therefore more luminous in operation, work at a little higher temperature, about 1,000° C, and are quicker in response. They are perhaps more " warm " in appearance but the older pattern is rather more robust and is cheaper.

Both types are in fact " Infra Red " heaters.

Convection Heaters of the portable appliance kind have a flat, wound on mica, " black heat," i.e., no-glow, element. The water or oil-filled steel radiators of conventional water radiator pattern have an immersion element fitted in the water or oilway, the elements being thermostatically controlled just as water heater elements are. Such appliances can only be regarded as local appliances but they can find useful application as supplements to other forms of domestic heating.

Tubular heaters in lengths from 2ft. to 17ft. in increments of 1ft., and up to four banks, offer a versatile form of combined radiant-convective space heating. Loaded at the rate of 60 watts/ft. run and operating at a surface temperature of about 200°C, they are usually mounted at low level to secure the utmost performance from

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a minimum air change of 600 cubic feet per occupant every hour. Operation is by use of a central ventilator or blower which distributes clean, fresh air, through ducts to ambient air diffusers in each room.

One or two diffusers may be installed in each room, depending on the volume of air movement necessary. Low temperature elements with ratings varying from 400 to 1,200 watts are fitted inside diffusers for heating purposes. The elements in each room are controlled by a room thermostat.

★ ★ ★

IN THE Thermalay system low temperature heater cables are located within a very thin layer of vulcanised rubber and then combined between two layers of extremely good quality felt.

In developing floor warming over the years it has been established that a 9/10 watts per square foot, giving

a floor temperature of 72/75 deg. F. is the ideal loading.

The Irish agents for Thermalay are Hughes & Coyle, 11 Blackhall Parade, Dublin. The manufacturers—Thermalay Ltd., Shelf Mills, Halifax, Yorkshire.

★ ★ ★

BICC's " Panelec " Rewirable Floor Warming system is an all-electric method of space heating designed to maintain comfort by low temperature heat radiation, utilizing the floor as the transmitter surface.

The system comprises heating cables enclosed with specially developed cable housing sections which are bedded in a layer of screed between the structural floor and the floor finish.

An expanded metal heat diffuser maintains a uniform temperature over the whole floor area.

Manufacturers — British Insulated Callender's Cables Ltd.; Irish Office, 53 South Williams St., Dublin.

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DOI: 10.21427/D78T5V

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the about 70% convective and 30% radiant emission components.

Flame proof tubular heaters are available for heating places where flammable gases may persist and special low operating temperature ones are obtainable for low flash point gas stores.

Fan heaters of the simple spiral wire element and exposed fan type for wall mounting are available in loadings from 3kW to 20kW. In the smaller sizes these have proved valuable as quick and effective local heat sources for intermittent or continuous operation. Churches, shops, work benches, etc., are typical applications.

Warm Air Heating by Electricity offers whole house warming at low initial cost, high thermal efficiency, and all the cleanliness and other operating conveniences of electricity. Such equipment is marketed in unit form comprising heater elements, usually spiral wound wire elements, a quiet fan and motor, all control switching and automatic thermostatic controls. It requires very little space, 3ft. x 2ft. x 16ins. will suffice for most. No fuel store or flue is required, and they may be fitted in the space underneath the stairs if need be. Warm, in some cases humidified air, is ducted to the various rooms through simply fixed flexible ducting. Selective heating enables one or more room heat to be turned off at will, thus making for fuel economy as the occasion arises. Cost varies according to size and manufacturer and according to the amount of ductwork involved, but somewhere in the region of £155 for a new house and about £175 for installation in an existing house seems to be a fair estimate.

Running costs, too, will vary but one case is known where full heating in a 959 sq. ft. modern house was maintained at 70°F in the lounge, hall at 60°F, and bedrooms at 50°F, for about £1 3s. 0d. per week.

In addition to selective control by manual switching and over-riding control by thermostat, these appliances lend themselves to time switch control. This provides for shut down during

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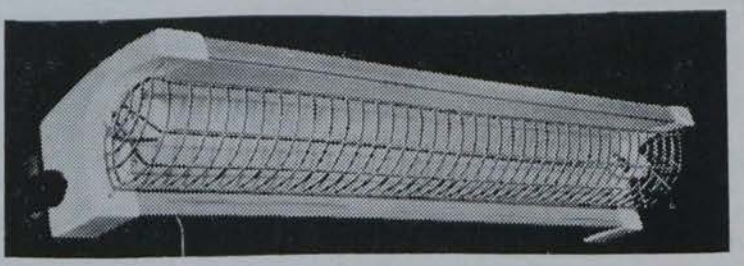


QUITE recently introduced by Unidare Limited, of Finglas, Dublin, is the Thermodare Home Heating Plan. The plan uses electricity mainly during the night at "off-peak" rates to provide, by methods of storage and release, overall warmth throughout the 24-hour period.

In a typical installation for a normal three bedroomed detached house we see that the main bedrooms are kept at even temperatures by domestic storage heaters; an immersion heater in lagged cylinder provides hot water throughout the year; the spare bedroom is heated by a Warmwave 100 "Infra-red"; this unit is also used in the bathroom and kitchen; domestic storage heaters give full central heating comfort in the sitting and dining rooms; and that background warmth is provided in the entrance hall and stairs by a domestic storage heater.

Our picture shows a model from the Warmwave range. This Infra-red unit operates at the 3-Micron Waveband, at which the human body is most receptive to radiant heat. With easy angle adjustment, built-in pull cord switch, hinged guard and special long-life element, this unit represents a great advance. Model 77 750 W. and Model 100 1,000 W.

EKCO Heating and Electrical Limited—represented in Ireland by Kelly & Shiel Limited—manufacture a wide range of products in the field of electric heating.

We will review here the Thermovent inset convectors, whose wall box depth is only 4½ in. This houses a fully wired element, duct and illumination assembly.

An amber lamp fitted in the interior provides a pleasant warm glow effect and can be used with the heating element switched off.

Models WI 125 and WIC 125 (with fitted thermostat) have loadings of 1¼ kW, while models WI 25 and WIC 25 (with fitted thermostat) have loadings of 2¼ kW.

★ ★ ★

THE ESWA low temperature radiant ceiling heating system has as its source of heat an electrically heated resistance foil designed for installation in sheet form immediately above the ceiling face.

The distinctive feature of the system is the even distribution of heat over large areas at a low temperature. The load of the heating elements varies between 15 and 20 watts (approx.) per square foot and, according to the particular requirements, will extend over 50 to 80 per cent. of the whole ceiling.

The heating mats are supplied in a comprehensive range of standard sizes and Irish agents are Messrs. E. C. Handcock & Co. Ltd., Handcock House, Fleet Street, Dublin.

★ ★ ★

PULLIN A2/W and A2/WNL Room Thermostats have been specially designed to control electric underfloor heating as well as many other electric heating units. Incorporated is a double action micro-switch which has a snap action on both make and break. This snap action is obtained without the aid of auxiliary magnets. No current passes through the bi-metal strip and inaccuracies due to self-generated heat are therefore reduced to a minimum.

All A2 models have a temperature range of from 30 deg. F. to 90 deg. F. If required A2/W and A2/WNL models can be supplied with numerical scale marked 1—7 with same temperature range.

The Irish agents for the manufacturers, R. B. Pullin & Co. Ltd., Brentford, Middlesex, are the National Agencies, 7 Upper Camden St., Dublin.

from previous page

night-time and automatic starting up at any pre-determined time before rising hour in the morning. Alternatively, where the whole family leaves home during the day, the time switch can be set to start up the appliance say, about one hour before the first member is expected back home. The fuel thus saved can make this kind of installation a very economical running proposition indeed. So much so that this form of domestic house warming is now enjoying a boom which shows signs of rivaling "small bore" heating in popularity. The electric heated systems of this warm air kind are serious competitors with warm air systems using any other kind of fuel.

Duct Insertion Electric Air Heaters form useful means of boosting air temperatures to rooms already warm air duct heated, but where higher than normal temperatures are needed, such equipment has perhaps more industrial than domestic application. Open wire wound coil element batteries of this type range from 3kW to 90kW. For heavier duties metal sheated elements enable capacities from 3kW to 500kW.

Automatic Control and the ease with which this can be applied to electrical equipment is just one of the advantages of the fuel.

Thermal Storage in water systems are thermostatically controlled on the primary water circuits. The secondary L.P.H.W. heating circuits are controlled by thermostatic mixer valves motivated by external response thermostats, or by room stats set according to the emission system adopted.

Thermal Storage in structure, i.e., floor warming, is controlled by room stats in individual rooms or by one master thermostat set at some optimum position in the building. A floor stat is deemed advisable to protect the system against overheating in the event of sticking or other unforeseen defect in the room stat.

Thermal storage in free standing block heaters can only be controlled on the input phase, and this applies to floorwarming too. Limit stats cut off the supply when a predetermined temperature has been reached. Output of heat is not controlled except by careful design of heat input in relation to anticipated subsequent heat output demand.

Block storage heaters have integral safety cut outs whilst a new idea introduces a temperature sensitive time switch which automatically reduces the input according to prevailing external ambient air temperatures.

FROM the vast range of Morheat panel heaters, we illustrate the "Venus" model 24R which has a rating of 300 watts and dimensions of 24" x 24" x ⅜". The voltage—220/250. It incorporates the revolutionary Mhoglas non-metallic safety element which provides a new and complete solution to safe space heating in the home.

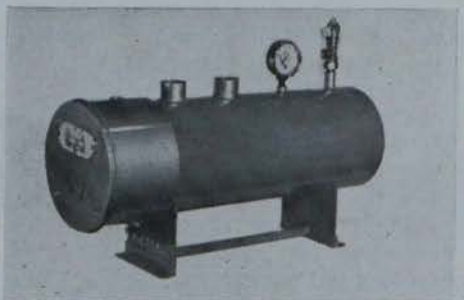
The element is basically a flexible fibre glass, fabric coated with a carefully controlled deposit of collodial graphite and thermo hardening resin and is practically indestructible.

The element is sandwiched between layers of top quality Swedish masonite,

the heat output of the panel being evenly distributed over the whole surface at a temperature of 120 degrees F. above ambient. Morheat Ltd. are at Church Path, Fareham, Hampshire, and their Irish agent is Eric G. Mullane, St. John's, Wyndberg Park, Blackrock, Co. Dublin.

★ ★ ★

THE circulator pictured here is from the range of Santon automatic electric central heating hot water circulators. Model QF is suited for



heavy duty and ideal for heating large buildings, churches, public swimming pools, etc. The unit has completely automatic control.

Loadings available in the QF range are from 12Kw (41,000 BTU/hr.) to 180Kw (612,000 BTU/hr). Much higher loadings can be obtained by coupling the units together. In this way there is no limit to the loading available.

Santon Ltd., Somerton Works, Newport, Mon., have appointed Charles Nolan & Co. Ltd., 2 Parker Hill, Lr. Rathmines Road, as their Irish agents.

★ ★ ★

A WIDE selection of panel and column Gulf hot water radiators come from Powell Duffryn Heating Ltd., Vale Road, Camberly, Surrey, whose Irish agents are Carlile & Co., Ltd., Drury St., Dublin.

Gulf radiators should only be used on a closed hot water heating system or in conjunction with a calorifier. Tappings are ½", ¾", and 1¼" British Gas Threads. The ¼" valve and key supplied as standard is recessed in panel radiators. Column widths are: 2-Column, 3¾", and 3-Column, 5½".

Detachable towel rails are available for both panel and column types.

★ ★ ★

HONEYWELL Controls have introduced a new control panel which when used with two-piece electric heating control system, provides centralised control of up to ten electric heating units. The panel contains five rotary switches and a time switch as well as four information dials, which consist of a clock, a barometer, an outdoor thermometer and an indoor thermometer-and-humidity-gauge combined.

A junior version of this panel without the automatic timing device and the information dials—the W476 control centre—is also available.

The Irish office of the Company is at 38 Upper Mount St., Dublin.

★ ★ ★

HURSEAL Ltd., Regent St., London, have introduced the exclusive "Hurseal Towel-Rad" distributed by Carlile & Co. Ltd., Drury St., Dublin. Providing ample heated towel space plus a radiator for room warmth, when used at full heat for both purposes it costs no more than a half-penny an hour to run. There are four models available.

https://arrow.tudublin.ie/bsn/vol1/iss9/1
DOI: 10.21427/D78T5V

Reporting

MUNSTER SIMMS OFFER COMPLETE DESIGN SERVICE

In this series a Contractor reporter reviews the domestic heating plans operated by the major oil companies in Ireland.

MUNSTER SIMMS have been engaged in the oil business for the past 70 years. A progressive company, they have kept up with the times and, as in the case of other oil companies, Munster Simms have entered the central heating market.

A careful study of the methods adopted to promote this activity both here and abroad has been made and they have evolved a scheme which, they believe, offers an excellent type of service to those interested in oil-fired central heating.

For **heating contractors, architects, builders**, they offer a complete design service advising on the type of equipment which they know from experience will be trouble free and efficient. The expert advice and professional design ensures a satisfactory installation.

Realising the vital importance, both from their own point of view and that of the installer, of securing satisfied customers, Munster Simms are prepared to give an undertaking of satisfaction to the client—provided, of course, that their design is carried out.

In case of difficulties they will gladly arrange to provide technical assistance in setting out a job. And on completion, they will arrange for an efficiency test of the equipment, at the request of the installer or his client.

Insurance

MUNSTER SIMMS now offers insurance on Domestic Central Heating equipment at a much lower charge than that normally quoted by insurance companies, states a Company official. This should prove of tremendous help to installers, particularly as an adjunct to maintenance contracts.

This feature should also appeal to architects.

Munster Simms can, and do, co-operate with architects, builders, etc., in group schemes and have announced a Fixed Price Installation available for grant-sized houses—up to six radiators, adequately sized for maximum output, for £330.

This figure covers boiler, pump, oil storage tank, etc. The Company also offers the installer a Package Deal.

Hire Purchase Facilities. — Munster Simms have arranged H.P. facilities in co-operation with United Dominions Corporation (Ireland) Ltd. A free life insurance policy is also provided, which covers the outstanding portion of the loan.

To summarise, Munster Simms offer a complete service to all those interested in the provision of oil fired central heating.

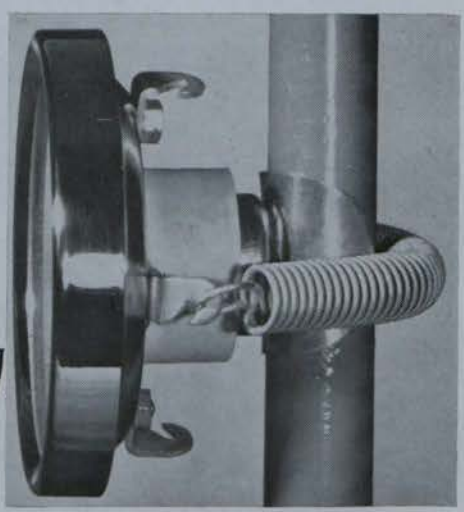
NEW PRODUCT

ROTOTHERM MODIFICATION

A modification to their spring fitting pipe surface thermometer which makes one model adaptable for either horizontal or vertical pipes, is being marketed by the British Rototherm Co. Ltd., Merton Abbey, London, S.W.19.

The thermometer now has four hooks—instead of two—at equidistant intervals at the rear of the dial. This allows the detachable spring, which clamps the thermometer to the pipe, to be fixed to the appropriate hooks, whatever the angle of the pipe.

The thermometer can be supplied with the spring suitable for pipes with a diameter of 1-1½in.; 1½--3in.; 2½-4in.; 3½-7in. Standard ranges are 50°/250°F or 10°/120°C. Irish Agents: B. Domigan & Co. Ltd., 17 Merchants Quay, Dublin.



The new four-hooked thermometer from British Rototherm.

Irish agents

In reviewing the range of Glow-Worm boilers in last month's special survey we did not mention that Monsell Mitchell and Company Limited are Irish agents.

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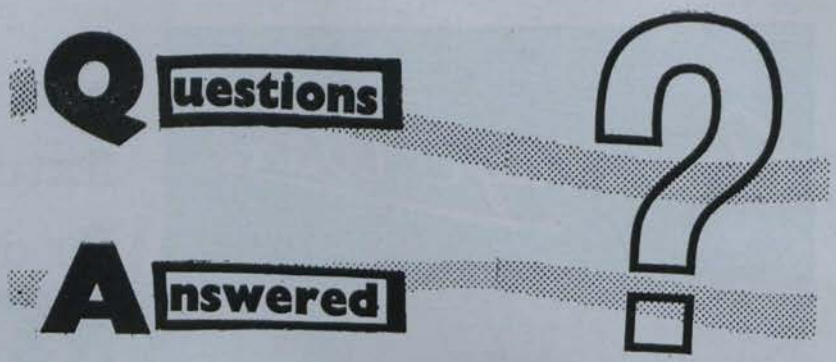

Is there an alternative treatment for the insides of cast iron boilers to make them rust resistant in soft water districts?

YES, the Bower Barff treatment, which derives from heating the boilers to red heat (Manhole covers, if fitted, are removed and similarly treated). Steam is then injected into the furnace and by rapid chemical reaction with the hot metal surfaces, a fine film of magnetic iron oxide covers the treated surfaces. This adherent film is chemically composed just as the rust which forms on iron surfaces normally but at slower rate. Since iron oxide cannot oxidise further the magnetic oxide film is itself proof against further rusting attack by the waters.

As an alternative treatment the boiler may be vitreous enamelled internally. Boiler manufacturers will quote for this treatment. If querist would like details of how this treatment is carried out we will gladly supply.

★ ★ ★

Can you offer a simple method of detecting the presence of dissolved lead in water?

IF a sample of the suspect water is placed in a test tube and a few drops of sulphretted hydrogen water be added, a darkening of the sample will indicate the presence of lead in solution. The darkening will be due to the precipitation of insoluble Lead sulphide from the reaction of the sulphur on the soluble lead hydroxide.

Carbonate of lead is barely soluble in water and therefore waters with high CO_2 content will not necessarily give rise to plumbo-solvency. Free oxygen must be present to combine with the lead to form the soluble oxide of lead. Organic acids will dissolve lead as can be shown by leaving clean lead parings in the bottom of a test tube of water to which has been added some acetic acid (Vinegar is a form of acetic acid with colouring added). Hence water gathered from peaty moors may have lead solvent properties.

An alternative reagent for testing the presence of dissolved lead in water is Potassium Iodine solution. This will produce a whitish precipitate if lead is present.

★ ★ ★

We have just stripped some sheet lead off a church roof. It appears to have been eaten through from its underside to the top, which still looks good. It was laid on softwood boards but no building paper was used. The underside of the lead is covered in white powdery substance.

THIS lead would seem to have suffered Carbonic Acid attack which has resulted in its conversion, from below, into Carbonate of Lead, a non-metallic substance better known as white lead.

The breath of many congregations with its CO_2 content has ascended to ceiling level where it has found its way through joints in the boarding to condense to a dilute Carbonic Acid on the underside of the lead. The result—a chemical attack to produce the whitish powder or Carbonate of Lead as described above.

When re-placing this roof covering with new lead the boarding should be covered with sarking felt. Apart from its other useful functions this felt acts as a thermal insulator and reduces this condensation risk. A layer of waterproof building paper laid first would act as a vapour barrier and effectively prevent contact of any moisture from below making contact with the new lead.

Each month this column will solve some of the everyday problems of the plumbing and heating engineer when our consultants deal with queries directed to "Questions Answered." All queries will be replied to and the most interesting published.

from page six

Faults in hot water supply systems

pipes over joists, etc., or to very tight pipe clips.

REVERSE CIRCULATION

THIS simply means that the water, instead of moving up the flow pipe when the boiler is heated, tends to travel through the return and so enter the cylinder. It is usually due to the fact that the return pipe on some systems provides an easier travel, for instance, if this pipe is slightly shorter than the flow. This reversal of circulation may cause noise, especially as it sometimes rights itself after an hour or so, or when a hot tap is opened.

It is not a serious defect and is often unnoticed. Its main disadvantage lies in the fact that the water enters the cylinder at the bottom, and so does not form a store of hot water at top quickly enough. The total heating period of the cylinder is, however, about the same. The defect can often be overcome by insulating the flow-pipe, but **not** the return.

This problem was dealt with in detail in the "Questions Answered" section of the September issue of this Journal.

https://arrow.tudublin.ie/bsn/vol1/iss9/1
DOI: 10.21427/D78T5V

from page seventeen

from lifting and blowing off in a strong wind. The widening gap between the slates prevents rainwater from "climbing" between them and into the roof by capillary attraction.

Tilting fillets of triangular sectioned timber are used for the same job of tilting the slates at places on the roof where no fascia board is fixed; for example, behind chimney stacks.

Note also that the "lap" of a slate is that distance by which the tail of one slate passes beyond the head of the next slate but one, below. This is a bit of a tongue twister, but the diagram will make it clear.

You will also see that the first course of slates at the bottom or eaves of the roof are shorter than the rest by the length of the "margin." The length of these under-eaves slates is equal to the "gauge" plus the "lap." For 20" long slates at 45° pitch this would be 8½" plus 3" or 11½" long.

Abutment is a building term used to describe the junction or meeting line between a roof edge and the wall against which the roof edge "buts." You will see many forms of roof abutment; for example, where a low level roof abuts the wall of a taller building; or where a chimney passes through a sloping roof.

Weatherings to abutments are necessary to prevent the rainwater that falls on their vertical wall faces from running down into the building.

Sheet lead, copper, aluminium, or zinc could be used for this work. The following description applies equally to all these metals, except in the case of certain setting out and working techniques which will be described separately as they arise.

The procedure for this kind of work is as follows:—

First, mark out and cut some soakers for the slaters to put in place as they finish off the slating along the roof abutments.

Soakers are pieces of sheet metal bent to form a right angle and are used to divert the water which flows down a vertical surface on to the sloping roof, and so prevent this water from getting into the building at the abutment. The length of a soaker is the sum of the gauge at which the slates or tiles are laid, plus the lap allowance, plus about 1" for fixing. The girth or all round width of a soaker is generally 7". This provides 3" of soaker to stand up against the vertical wall face, and 4" to lay under the slates.

The number of soakers required for a given length of abutment of roof slope to wall, is the same as the number of slates or tile courses in that length. If one were preparing for a job where the number of courses was not given, but where the size of the slate or tile and the lap to which it is to be laid were known, as well as the abutment length, one could work out the number of soakers needed by dividing the slope length (in inches) by the gauge (also in inches). These measurements can be worked out from what one knows of the slate and lap lengths.

For example, assume that a 17' 0" length of abutting slope is being laid with 20" x 10" slates with a 3" lap.

$$\text{The gauge} = \frac{\text{length of slate (in inches)} - \text{lap (in inches).}}{2}$$

$$= \frac{20" - 3"}{2}$$

$$= 8\tfrac{1}{2}" \text{ gauge}$$

Then number of soakers required:

$$= \frac{17'\ 0" \times 12 \text{ (to bring feet to inches).}}{8\tfrac{1}{2}"}$$

$$= \frac{204"}{8.5"}$$

$$= 24 \text{ Soakers}$$

Cover flashings are now needed to guide the water falling down the wall face over the upstand of the soakers, and on to the sloping surfaces which will take it to the gutter.

Where the abutment does not have a slope but is straight, for example where the top end of a single slope roof abuts a wall, the cover flashings will be cut in straight lengths of suitable width and length. Where necessary, joints would be seemed or welted in sheet copper, aluminium or zinc work, and for lead they would be lapped one over the other for some 4" or 5".

Raking or stepped cover flashings are necessary where the abutment slopes, as for example at the sides of chimneys or where a roof slope meets a vertical wall.

The setting out of stepped cover flashings is illustrated here and a brief description of the procedure is as follows:—

1.—Carefully mark out the required length and width of metal sheet with a soft pencil in the case of copper, aluminium or zinc, and chalk or a chalked line for lead.

The width allowance for roofs with a pitch of 45° is 6" to 7" but, in order to get the 2½" cover extension on each "step," this width will have to be varied to suit other pitches.

Allow extra metal at the bottom end if this is to turn around the front wall.

2.—Cut the strip of metal, take it to the roof, and offer it into position so that the bottom line of the brick bed joints can be marked on and extended until they meet the "water-line."

A line drawn from where a joint line cuts the "water-line" to the joint line above and at the top edge of the strip, will give the line of "cut back" for one step.

3.—Carry on marking other steps in this way, and allow about 1¼" at the top of each to be turned into the brick joints. Cut away the unwanted triangular pieces, saving them carefully for scrap, or for use as fixing wedges. The 1¼" turns on each step are made to fit into the brick joints, and the step flashing is then ready to be finally secured in place with "tags" or wedges of the same material.

The bricklayer completes the weathering by filling and pointing the brick joints with mortar.

This method is quite commonly used, and is the only one suitable where the walls are built of stones of many different sizes, and not laid to regular courses like bricks.

The pre-fabrication of flashings is an idea that saves time and money, especially where weathering details are repeated throughout a job. It can be helpful, too, if rain or other holdups prevent work on the roof.

It is perhaps wise to wait until the building part of the job is complete, and to then number and measure each detail separately.

This information is taken back to the workshop, where if necessary it is reproduced as a full size picture of the job.

A Ridge Piece is needed to weather the raking stepped flashings where they meet near the ridge of a roof abutting against the gable end wall of the main building.

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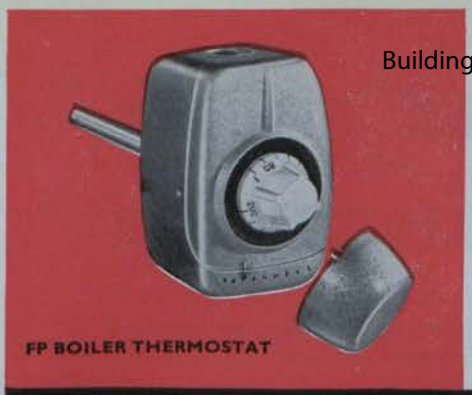
Published by Irish Trade and Technical Publications, Callaghan Chambers, 13-15 Dame Street, Dublin.
Printed by The Greyhound and Sporting Press Ltd., Davis Road, Clonmel.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XPM MOTOR


XC CONTROL BOX

A Guide to SATCHWELL AUTOMATIC CONTROLS


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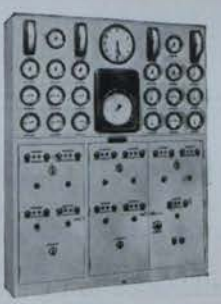
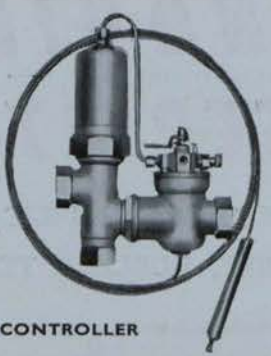
TL ROOM THERMOSTAT


CENTRAL CONTROL PANEL


DUOTRONIC CONTROLLER


BMT CONTROLLER


C4 COMPENSATOR

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Full details of any—or all—of these Satchwell automatic controls will gladly be supplied on request.

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DOI: 10.21427/D78T5V