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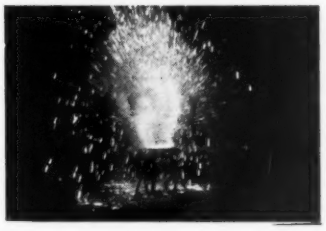

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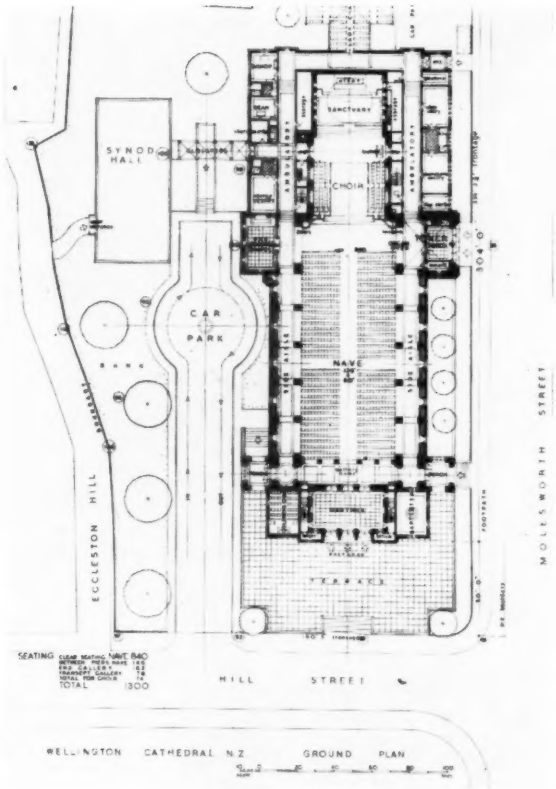
The Editor will be glad to receive MS. articles and also illustrations of current architecture in this country and abroad with a view to publication. Though every care will be taken, the Editor cannot hold himself responsible for material sent him.

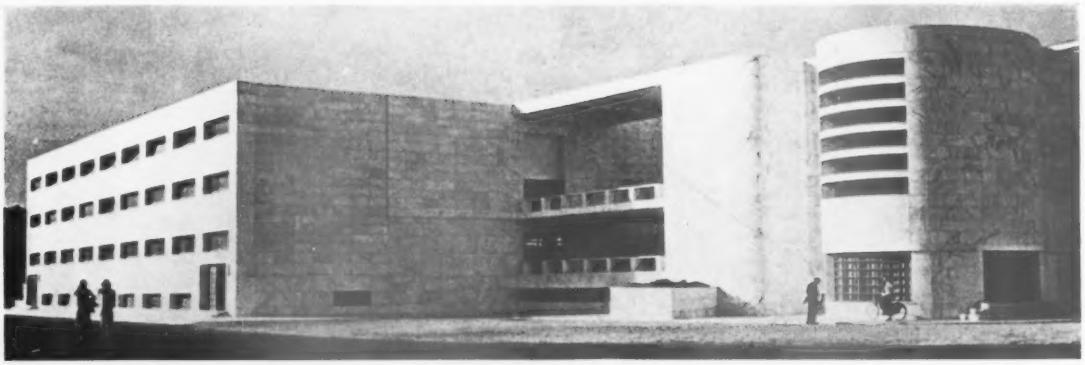
THURSDAY, FEBRUARY 22, 1940. NUMBER 2353 : VOLUME 91

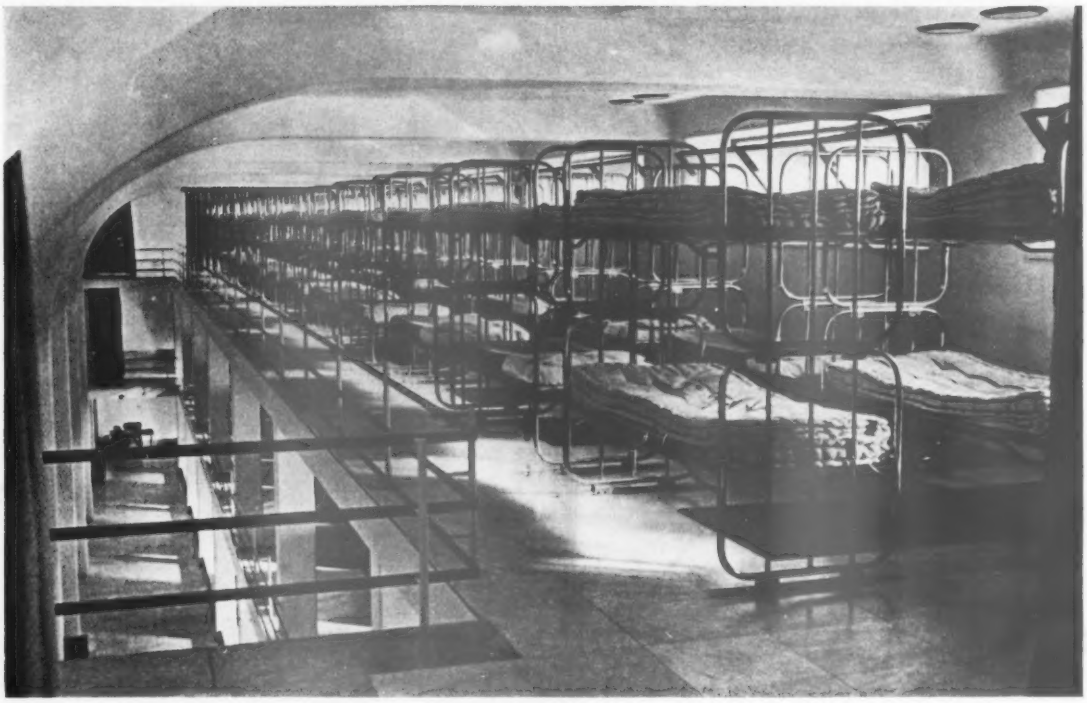
PRINCIPAL CONTENTS

PROPOSED NEW CATHEDRAL, WELLINGTON



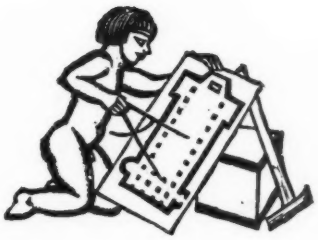
Two perspectives and plan of the new Cathedral to be built at Wellington, New Zealand. The architect is Mr. Cecil Wood. To conform with the bye-laws of the country in regard to the Earthquake Building Code, the Cathedral will be constructed entirely of reinforced concrete. The foundation stone is to be laid in November next.





THE ROME FENCING ACADEMY

Top, a general view of the new building, which is situated near the Mussolini Forum. Bottom, the students' dormitory; tier beds have been used to provide the maximum accommodation for students.



BOMBS AND THE CHILDREN

ON February 7 Lord de la Warr announced that the Government intended to re-open schools in urban areas at the earliest possible moment, and it has since been stated that half-time attendance for all children by April 1 is the least the Government will accept.

There will be no disagreement that the present situation is intolerable. At the end of August there were about 1,600,000 children in the dangerous evacuation areas. Of these, only 700,000 were evacuated, of whom about 300,000 have since returned. There are thus 1¼ million school-children in dangerous areas, of whom half have had no care or schooling at all for five months and the other half cannot have had much of the consistent and continuous quiet guidance which is the major part of education.

The 400,000 official evacuees still in reception areas have by now had some sort of schooling arranged for them: and if ever medals were well earned, they have been earned by education personnel in reception areas. But when one considers the poor accommodation of rural schools, widespread billets, the constantly decreasing numbers of children, home-sickness, long walks and difficulties with parents and receiving families, it is no aspersion on teachers and education authorities to conclude that the schooling so far arranged is unsatisfactory.

To change these conditions, Government action is needed. That action must reconcile tolerable education and greatest safety for the children with least hardship for parents and children; and with a state of war in which bombing of urban areas may come at any moment. The policy which results from such considerations must then be reconciled with the money and labour power which can wisely be diverted from other uses.

The size and responsibility of the decisions which must be taken are huge. What is more, the policy adopted should be simple, should be emphatically announced, should be adhered to for the duration, and should be capable of execution in a short time.

What are the plans which the Government is making in these circumstances? On February 15 the Minister of Health outlined Government policy. It falls into three main parts. Urban schools will be reopened and equipped with air-raid shelters; parents whose children are already in safe areas will be encouraged to keep them there; preparations will be made for a second evacuation from dangerous areas as the need arises in each area.

The advantages of this scheme are that it restores, for the time being, education for children in dangerous areas, it allows for a reorganization of billeting, and it substitutes local for wholesale evacuation.

But its faults—even in its present sketch form—are grave. It postulates evacuation during bombing or acute danger of bombing. It prevents any certain knowledge being obtained of how many children will be involved and applies no absolute bar to children, once evacuated, being recalled at parents' will. It does not include mothers and babies. And it provides *no special protection and care* for children whose parents keep them in dangerous areas.

It is this last which defeats the whole object of evacuation. Evacuation is intended to remove children from air raid dangers and post-raid surroundings and allow them to continue some form of education. As it now stands the scheme's success is dependent on those least responsible parents who do not allow their children to go. Urban schools are to be closed once air raids begin, and the sins of the short-sighted parents may be visited most dreadfully on their neighbours and on the children themselves. Parents' rights are one thing: children exposed to air raids and after-effects of raids in badly-damaged sectors of towns are quite another.

It would seem that the Government's present fluid scheme could be extended at no great cost to remedy most of this evil. Each school could be made an A.R.P. centre for children and remain open always. This would require urban volunteer workers in schools only, and a strong shelter, first-aid point and emergency feeding and sleeping arrangements in each school. From the moment an air raid began, the school staff and volunteers could take entire charge of the children until the danger period was past. If one section of the town was damaged, the children affected might well be evacuated for some weeks while children from other sections could return home after a day or so. Such a system would confer on the education authority the chance of wise decision and provide for the children special protection and guidance in surroundings of relative calm.

This extended scheme does, however, involve the principle of compulsion if it is to be successful. In its latest announcement the Government has stroked but not grasped this prickly staff: in its final decision it must decide whether the arrangement which has been adopted as the best by all wiser parents is or is not to be withheld from the children of the rest.

The Architects' Journal
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NOTES & TOPICS

POST WAR PARADISES

In a recent broadcast, Miss Helen Simpson remarked, rather acidly, that from a state of emergency surely something ought to emerge. With this object in view, 150 professional men, physicians, sociologists, economists, architects, industrialists, met at the R.I.B.A. two weeks ago to discuss the replanning of our post-war national life. Among those who attended were Lord Horder, Lord Balfour, Mr. Harding Thompson, Professor Abercrombie (described in one paper as a Cambridgeshire educationalist) and Mr. Henry Morris, the Cambridgeshire educationalist, (described as an industrialist). The meeting was convened by Mr. Max Lock, the new head of Hull School of Architecture, and among questions touched on were the establishment of giant health centres in the country, the revival of new industries in derelict areas, the abolition of ribbon development and the decentralization of industry.

*

That occasional meetings of such eminent "constructive" men should be held in wartime is doubly good. They remind us that constructive effort and thought still exist; and they enable those who have been thinking of social remedies from one point of view to compare results, and perhaps establish a general uniformity in objectives, with those whose approach has been entirely different.

*

Yet immediately occasional discussion of great subjects undergoes a slight change and becomes a group with a programme, I for one feel great discomfort.

*

The last three years have made us all ponder over remedies for the events that have overtaken us. We have most of us tried to master, for the first or second time, the general principles of large reforms which have been advocated—whether political, social or technical.

But things have not stopped there. An obsession with ideas and schemes of the largest possible size has spread through societies, committees, schools and individuals. Students will hardly accept a scheme unless it involves the replanning of a continent. Committees dislike an agenda which does not turn a profession sharply upside down. Some individuals hold that reform in the building industry must begin with the socialization of Britain, and others are seeking to pour out their conception of world reform in 500 pages of mingled Lewis Mumford and Yeats Brown. And all the time, everywhere, societies, groups and committees are setting cheerfully about some research which, for its tolerable performance, would require the full-time, life-long labour of half-a-dozen exceptionally able men.

*

The good point of these happenings lies in their proof that many more people are thinking about contemporary problems. Their weak point is their showing that too many people imagine that by propounding a riddle, they are getting near its solution; and that far, far too many are forgetting that for the next 20 years, simple, immediate, small scale achievements will be needed more than any panacea.

*

Most people agree vaguely with the principles of Territorial Planning, National Roads, Federal Union and all that. What they need to reinforce their loyalty is just one small bit of practical achievement towards realizing any one of them.

LAST REFUGE TOTTERS

Liverpool Street is the grubbiest of the London termini, and, judging by the daily press, the trains which serve it are equally noted for their quaint, old-fashioned appearance without and their ill-lit squalor within. Travelling conditions north and east from London are, in fact, ripe for Haw-Haw's comment.

*

London Transport have, however, announced that, despite the war, they are proceeding with their programme, launched in conjunction with the L.N.E.R., to improve railway services in E. and N.E. London. Contracts have been signed for the building of two new stations at Leytonstone and Hainault, on the extension of the Central Line, and work is to start immediately.

*

This will be good news for the City worker, but not for our week-ending young novelists. Chased out of Surrey and hounded out of Kent by the creeping advance of suburbia, they found in Essex an inviolate area, guarded from invasion by its unspeakable railway service. These happy days will soon be gone. When peace breaks out, the horn-spectacled locusts will again be on the march. Where will they settle next?

SCOTTISH HOUSING

There is far stronger feeling in Scotland about the housing ban than in England—probably because the slum clearance has been proceeding more slowly.

It is calculated that 300,000 houses are still needed to end Scottish overcrowding, and the timber shortage threatens to hold these up indefinitely if normal construction is adhered to.

*

The Glasgow Housing Committee have therefore had designs prepared for "timberless" houses of brick and concrete, with stairs, windows, doors, skirtings and frames of steel or cast-iron. The new materials are expected to add 15 per cent. to the cost of the houses.

FROST AND THE PIPES

Three weeks ago I commented with mild surprise and pleasure on the absence of the usual witch-hunt of the building fraternity during the frost of early January.

*

In writing this I quite forgot the Censor. Tens of thousands may have been demanding our scalps in every *Letter to the Editor* in the country. Never a threat was published. It is a pleasing thought.

*

This week some of the facts of that far-off time have been creeping out. Bristol comes high with 2,300 bursts on its municipal housing estates alone. Edmonton had a mere 500, and a South London estate of unknown size had not for three days a drop of water which arrived by the usual means. I am certain that statistics would show that in the cold areas one house in three was frozen up.

*

Not that it is worth worrying about. A 40-days' freeze-up every year for seven years might lead to the nuisance being remedied. Until that happens nothing else will.

INFORMATION CENTRE

The chief of the JOURNAL's Information Centre has shown me a serious inquiry as to whether it is possible to ascertain, by experiment or calculation, how long a hot-water boiler and cylinder of 30 gallons capacity can function without disaster if the cold water supply is cut off.

*

After the cold spell of January, some of the phrasing in this question has great charm. The implications of "by experiment or calculation" and "without disaster" are specially alluring.

*

The research student, moreover, is not handicapped by rigid prior assumptions. He can assume (or create) a roaring fire or a small one; he can close all taps or open them; he can freeze the expansion pipe or the tank or both or neither. He can even turn on the cold water supply again at the end—preferably under high pressure, when the system is empty and the boiler white-hot.

*

The question was, however, quite serious and is recommended for solution by anyone who has taken a short non-repairing lease of a house equipped with a good air-raid shelter.

FINLAND AND US

I announced three weeks ago that Alvar Aalto, Finland's greatest architect, was serving with the army. I have now received a letter from him. It is not about architecture; but is not on that account of less interest to us all at this time Here it is:

I have tried to formulate my ideas on the present war and way in which it will develop. To me its principal feature is the concentration of attack on civilians. Russian bombers always single out for attack the smaller villages and civilians in the open.

*

Because this warfare is new, help for those who suffer from it must take new forms. Most countries want to help Finland; and in the past this has been done in a "humane" way by helping civilians by clothes and food.

*

But the help the civilians want in this war is protection from bombers. I believe the conception of humane assistance must, therefore, be altered to include supplying means of active protection—which means fighter aeroplanes.

*

Such a change of opinion might develop into an effective protest against air-war on civilians and be true humane assistance.

*

The battle here is not only Finland's war—it is one for us all. It is only geographical chance that it is taking place here. Help of an active kind given to Finland may develop into a world protest, and protection, against totalitarian war.

ALVAR AALTO

C. F. A. VOYSEY

The Royal Gold Medal for this year has been awarded to Mr. C. F. A. Voysey. To all architects the choice will at once seem the only possible choice; and I think most will feel that it is not so much an honour to Mr. Voysey as the least tribute which his profession could pay him.

*

Mr. Voysey began practice in 1882, and at once took part in the crusade against arid stylism in external architectural form and crowded mechanical thoughtlessness inside, which Morris and Philip Webb had begun twenty years before.

*

The outsides of Mr. Voysey's famous houses were controlled by plan, by elements—such as roof and chimneys—and by the implication of materials; and thus paved the way for Lutyens. The insides, controlled by the same concentration on purpose and materials, seem today to share with those of C. R. Mackintosh the ancestry of much of the modern movement in interior design.

*

For his houses, Mr. Voysey, like Morris, found it necessary to design everything afresh. He did it thoroughly; furniture, wallpapers—even knives, forks and cruets. And the exhibition held at Batsford Galleries in 1931 proved how very well he used to do it.

ASTRAGAL

NEWS

General

ON THE AIR

The B.B.C. announces that an interesting Yorkshire personality is to come to the microphone on February 26, at 3.35 p.m., in the "Northcountrywoman" series. One of the very few women builders in the country, Mrs. Gertrude Bray, a Leeds woman, still in her early thirties, has built an estate of approximately 200 houses, on the outskirts of Leeds, at Crossgates.

Charles Holland, a Lancashire plasterer who has often broadcast on different aspects of his work, is to take part in the Children's Hour programme from the North on March 2. His subject this time will be "Things we come across at work."

BANNED COMPETITION

Following notice has been issued by the R.I.B.A. :

"The Competitions Committee desires to call the attention of members to the fact that the Conditions of the proposed International Competition for National Opera House, Belgrade, are not in accordance with the Regulations of the R.I.B.A. The C.P.I.A. is in negotiation with the promoters in the hope of securing an amendment. In the meantime, members should not take part in the competition."

CONFERENCE

A conference on "National Planning Policy," promoted by the Garden Cities and Town Planning Association, was held in London last Saturday. A seven-point "Planning Front" statement, embodying the outline of a policy on which, it is suggested, all organizations interested in the right relationship of town and country and the best environment for the people might agree, in order that a public opinion may be created and Government action pressed for, was submitted to the conference. The points are as follows :

We subscribe to, and urge on the Government and Parliament, the adoption so far as practicable of the following principles in the administration of town and country planning and legislation relating thereto :

1. Central machinery should be set up for National Planning and to enforce, in conjunction with the administration of the Town and Country Planning Act, a national policy to conserve the national resources and to guide future land development and redevelopment and the general grouping of population in accordance with the following broad policy.

2. The distinction between town and country should be maintained in all development; isolated or widely sprawling houses, factories, or other buildings in the countryside being strongly discouraged.

3. In particular, good food-growing land, recognized beauty-spots, and wild areas suitable for national parks or recreational districts, should be protected from ordinary building development.

4. Wide country belts should be preserved around all cities and towns, and the density of urban areas limited sufficiently to permit of the building of houses with gardens for all who desire them, and also to permit of the provision of playing fields on some accepted standard at reasonable distances from all houses. No future development or redevelopment to be allowed which does not comply with these standards of density and open space provision.

5. New development necessitated by industrial changes or by the growth of existing centres up to the maximum permitted limit within their green belts, should generally be based on existing smaller centres. In regions where new towns are desirable, their location should take into consideration the needs of industry, agriculture, and social amenity and they should be planned as compact units. Ribbon development and scattered buildings should be prevented.

6. Power should be taken to restrict under licence the settlement of new businesses in overgrown or congested towns and in undeveloped rural areas, while leaving to business firms the maximum freedom of choice among areas where such restriction is not imposed.

7. In order that reasonable compensation may be paid to owners deprived of prospective building value, a national compensation fund should be set up, derived from the values of land zoned for building, and strictly earmarked for compensation under planning schemes.

MAINTENANCE SCHOLARSHIPS IN ARCHITECTURE

The Architects' Registration Council of the United Kingdom offers for award in June next certain maintenance scholarships in architecture. The scholarships will consist of a grant for the payment, in whole or in part, of the school fees and necessary subscriptions, instruments, books, etc., and, when necessary, a maintenance allowance not to exceed as a rule £100 a year. The scholarships will be renewable from year to year until the student has finished his or her school training. They will be available for students of British nationality who could not otherwise afford such training to enable them to attend architectural schools approved by the Council. The scholarships will be available both for students who have already begun their training and for students wishing to begin their training. They would not normally be granted to students under 17 years of age. Particulars and forms of application may be obtained from : The Secretary to the Board of Architectural Education, Architects' Registration Council of the United Kingdom, 68 Portland Place, London, W.1. The closing date for the receipt of applications, duly completed, is March 26, 1940.

OBITUARY

We regret to record the death of Councillor J. Teifion Williams, the Swansea architect, at the age of fifty-one.

During the last war he was engaged as an architect in Government service in London. He was architect to the Llwchwr Urban District Council, previously the Swansea R.D.C., from 1919 to 1933 as a full-time architect, and from 1933 to 1939 as a part-time official. He had an extensive private practice at Swansea and Cardigan.

Mr. C. F. A. Voysey, who has been awarded the Royal Gold Medal for Architecture. See *page 203.*

EXHIBITION

"The Homes They Come From" is the title of an exhibition now being held at The Housing Centre, 13 Suffolk Street, S.W.1. It will remain open until March 21.

LECTURES

Thursday, February 22.—Society of Antiquaries. "The Excavation of the Sutton Hoo Ship-Burial." By C. W. Phillips. 5 p.m.

Tuesday, February 27.—Housing Centre. Luncheon. "Nursery School Children in War-time." By Miss T. Marriott, Secretary, Nursery School Association. 1 p.m.

CORRECTION

On page 175 of last week's issue we reproduced some of the prize designs of the Welsh School of Architecture, the Technical College, Cardiff. The caption to the illustration at the top of the page was incorrect ; it should have read "4th year design prize : A Holiday Camp. By T. D. Gedrych."

ANNOUNCEMENT

Messrs. T. Brownlow Thompson and Fisher, of Hull, have transferred their office to Middleton Chambers, Lowgate, for the duration of the war. (Telephone 15586/7.)

Building

B.S.I.

British Standard Specification for Natural Aggregates up to 1½ in. nominal maximum size for concrete for structural purposes, including roads (B.S. No. 882) has just been issued :

Some of the difficulties of drafting a standard which would adequately cover the wide range of aggregates available, many of them possessing specific characteristics, is referred to in the foreword, which states that considerable research has been necessary in order to safeguard against the possible ruling out of anything which may be satisfactory, and at the same time to ensure that no aggregate would be passed which is unsatisfactory. Much of this work has been carried out by the Road Research Laboratory. The Standard may broadly be regarded as falling into two parts.

The first part covers the general requirements with which all aggregates must comply, and it also includes details of the gradings for aggregates of the various standard sizes. These gradings have been based on a selected series of British Standard Sieves with a view to the elimination of unnecessary sizes. The second part includes appendices which outline the methods of sampling and describe the manner of carrying out the different tests for determining the various properties of the aggregate.

Several of these tests are not referred to in the first or general part of the Standard. They have been included, however, so that when an engineer requires an aggregate which possesses some specific property he can specify an appropriate test to determine the suitability of the aggregate supplied. In such cases he should clearly stipulate the particular tests to be carried out and also the limits within which he requires the aggregates to comply. The aggregate covered by the standard is suitable for concrete used in all structural work, including roads, and it will, therefore, cover a very wide field of interest.

Copies of the above new British Standard (No. 882) can be obtained from the British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s. (2s. 2d. post free).

Details of other Specifications recently issued are given on page 221.

CANADA

Building activity continues to lag in Canada. The value of construction contracts awarded in 1939 was somewhat greater than in 1938, but was still considerably below the total for 1937. Residential

building has been more active, construction of this nature—particularly of low-cost workmen's dwellings—being encouraged by the assistance afforded by the Dominion Government. The encouraging factor in the construction situation at the present time is the increase in industrial contracts. While the total is still comparatively small, it is nearly one-third greater than the corresponding total for 1938. As industrial activity quickens, augmented by armament and other war orders, increased building for industrial purposes may be anticipated.

LETTERS

Architectural Criticism

The JOURNAL *has received the following letter from a layman who is well known to many architects :*

SIR,—I am rather mystified. We have been told for a long time that the public must be made to understand that architecture is not primarily a matter of æsthetics, certainly not largely a matter of appearance. The public must get rid of its old notion that the architect is mainly interested in the "look" of a building and must be taught to realize that the modern architect, whatever his predecessors may have been, is primarily a planner, a designer of buildings efficient for their purposes, light and air, circulation, the efficient arrangement of parts, fitness for function, and so on and so on. All very true and very important. But this is where the mystery comes in.

Many pages of the New Year issue of THE ARCHITECTS' JOURNAL are devoted to criticism of the buildings of the year. Most interesting and stimulating. But what startles me is that this criticism is almost entirely on "æsthetic" lines. The critics seem to be interested almost exclusively in the *appearance* of the buildings.

I find a constant emphasis on "style," "the dramatic and picturesque," "the contrast between ranges of small and large windows," "the delicacy in balcony railings," "the charming contrasts in surfaces," "the rhythm," "the air of distinction," "the curved ends giving distinction," "the fine shapes," "the high, almost cathedral-like appeal to the imagination," "the elegant and highly refined," "the masses and fenestration," "the rich effect of large mullioned windows set in deep tiled reveals," "the slightly Italian Fascist appearance," "the dignified and elegant," "the masses jutting out too crudely," "the gentle elegance," "the best-looking office building," "the ensemble not carefully considered," "the dead and dull looking," "the expression by projecting sill lines," "the rare distinction and charm," "the romantic and modern," "the charming Italianate detail," "the dramatic effect," "the heavy-looking balconies," "the masses composing very well," "the feeling that a building is too tall," and so on *ad lib*.

For the life of me I cannot see why the earnest man in the street, after reading all this, should not go away with a fixed conviction that *appearance* is far and away the most important thing to the architect, that in fact the *æsthetic* is what he is really concerned with.

Is it wise to give him this impression? Ought you not rather to be making him realize that what you do consider most important is the *use* of the building, pointing out to him how the good building serves its purpose better than the stuff put up by the ordinary engineer or builder, emphasizing its virtues of plan, circulation, light, ventilation, and practical arrangement of every kind? — or would practical criticism of this kind not really appeal to anyone? 'ONLOOKER

The JOURNAL *entirely agrees with* ONLOOKER *that, when writing to interest laymen, architects should keep strictly to usefulness, convenience and other aspects of good design which he lists. But the* JOURNAL *is written for architects and therefore* ONLOOKER'S *censure, arising chiefly from Professor Reilly's very individual* Review of the Year, *is surely based upon a wrong assumption.*

The Borders Case

SIR,—Your leading article for February 8, entitled "Mrs. Borders and You," is timely, and presents some of the facts of a problem, the solution of which should be one of the principal peace aims of our profession.

The process of decentralizing industry which has already begun is likely to develop, and much of the war-time transplantation of population will become permanent. Many of the smaller towns, whose character is an essential part of England, will be doubled or trebled in size.

Is the great bulk of this work of housing the nation to be carried out, as heretofore, by uneducated, unprincipled speculators whose sole aim is to make money, not the provision of the best possible houses for the people, and the preservation for them of natural amenities?

What contribution has the architectural profession hitherto made towards improving this state of affairs?

1. For the last fifty years or so the slogan "Educate the Public" has been repeated with more or less vigour, and with what results? As you have said, the services of architects are now considered essential for State-aided housing, and on the whole, such housing justifies this belief.

There has been a noticeable improvement in the more costly public, commercial, and private building.

But our educational efforts, so far, have not touched the great body of small house dwellers.

2. The Town and Country Planning Act has become law, making available to local authorities the power to control elevations and to make use of Advisory Panels. Here, again, our education has not been sufficient to persuade many local authorities to exercise their new powers, but the Advisory Panel, if made use of, though excellent in principle, is faced with practical difficulties, especially in small centres.

3. The R.I.B.A. has sanctioned a special scale of charges for part service in speculative housing work. This concession in the matter of fees is a valuable contribution, but the value of part service of this kind is questionable. What does the average speculator employ an architect for? Merely to draw the plans necessary to get his scheme approved by the local authority, and in order to use an architect's name.

The architect in such cases has no responsibility for specification, nor does he supervise erection, and his designs are frequently travestied. But one must not ignore the fact that many of the least meritorious designs are the work of registered architects and members of the R.I.B.A., or at any rate are produced in their offices. A somewhat unpalatable truth this.

In the present period of enforced unemployment, we may well do some constructive thinking and planning for the post-war building expansion to which we are told to look forward.

May I suggest three ways in which the problem might be approached by architects, individually and as a profession?

1. Within the profession by seriously tackling the problems of small house design and construction, and the related town-planning matters; and by undertaking the specification and supervision of such work on special terms.

2. By working for legislation (*a*) to protect the public against the plausibility of the speculator and his meaningless specifications and guarantees; (*b*) for some degree of State control of loans for private housing, requiring some standard of design and specification; (*c*) the revision and

general adoption of the Town and Country Planning Act.

3. By propaganda designed to reach that part of the community most concerned.

This is a matter of vital importance to all architectural bodies and individuals, whether they are more particularly concerned with the advancement of architecture, of the profession, or with the preservation of natural amenities.

May I therefore suggest that it is a matter which might well be dealt with in your columns, in the same able way in which were ventilated such questions as Slum Clearance, Carlton House Terrace, and Structural A.R.P., to mention only three in recent years.

A general survey, enquiring into all sides of the case, and the formulation of a programme for collective effort and presentation of the problems in official quarters, would be a most valuable piece of work.

LAURENCE H. BOND

R.I.B.A. Exhibitions

SIR,—It may interest you to know that the R.I.B.A. exhibition organization is being kept alive, and it has been heartening to learn that the "cultural blackout" is certainly not total as far as this activity is concerned. Of some 75 museums and art galleries which normally display our exhibitions from time to time, about 50 are still carrying on.

Since the outbreak of war, which necessitated a complete reorganization, the Small House Exhibition has been shown at Kettering and Dundee, and is at present at Rochdale: the Road Architecture Exhibition was shown at Gateshead and is now at Darlington, and the Airports and Airways Exhibition has been shown at Burnley. Gateshead had the remarkable total attendance of 11,500 persons.

The Health, Sport and Fitness Exhibition is being displayed at the New Zealand Centennial Exhibition, with the possibility of its going to Australia.

The British Architecture Exhibit will remain at the World's Fair, New York, for the second year if the present proposal to open the Fair is adhered to. This exhibit has been offered to the American Institute of Architects, who may be able to arrange a tour if and when it is released.

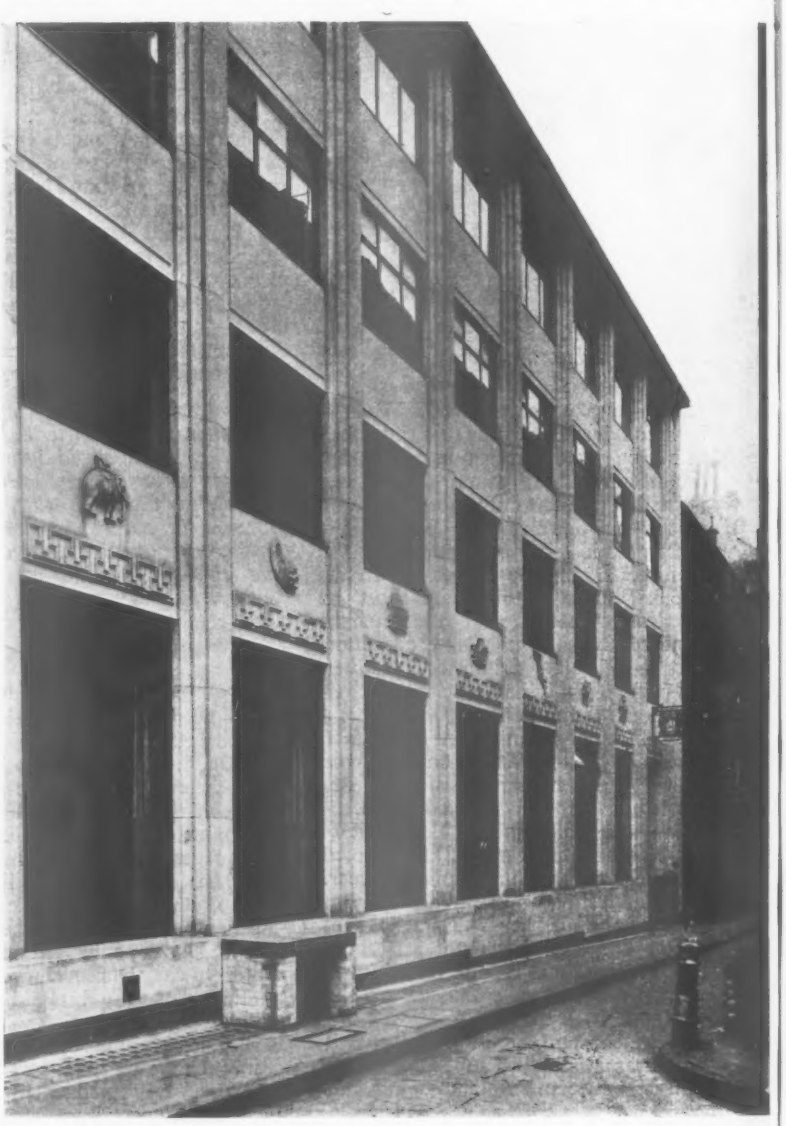
At the request of some of the galleries, the following small exhibitions (150 to 200 photographs) are being arranged:

1. Famous sites and buildings from the air—aerial photographs and surveys.
2. Domestic architecture.
3. Schools (exhibit shown at Royal Show, Windsor, 1939).
4. Museums and Exhibition Buildings (exhibit shown at Museums Conference, Cheltenham, 1939).
5. Churches.
6. Plan for a New Town (model designed by the School of Planning).

R. A. DUNCAN
Hon. Sec., R.I.B.A. Exhibitions Committee.

OFFICE BUILDING, BURY

DESIGNED BY SIR JOHN BURNET,



The main elevation to Bury Court. The carvings at first floor level, of Shipping, Commerce and Transport, were designed and executed by Joseph Armitage.

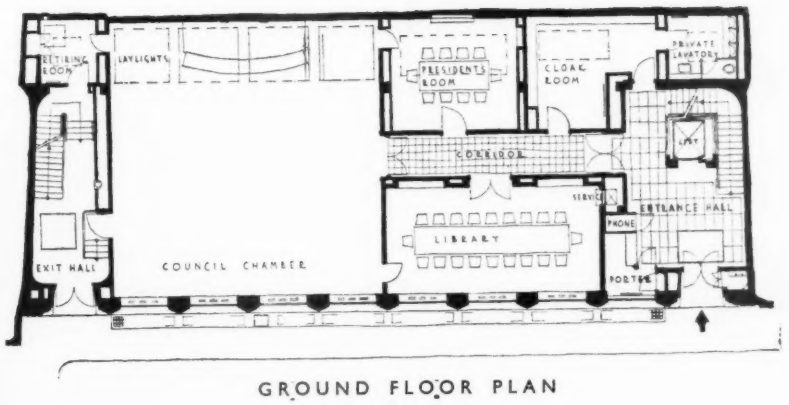
GENERAL AND SITE—This work was carried out by Mr. L. G. Farquhar, of the firm of Burnet, Tait and Lorne, who is now serving with the Gordon Highlanders. The new building for the Chamber of Shipping of the United Kingdom is situated in Bury Court, off St. Mary Axe.

PLAN—The building has been designed for the dual purpose of providing accommodation for meetings of the Council and its various committees,

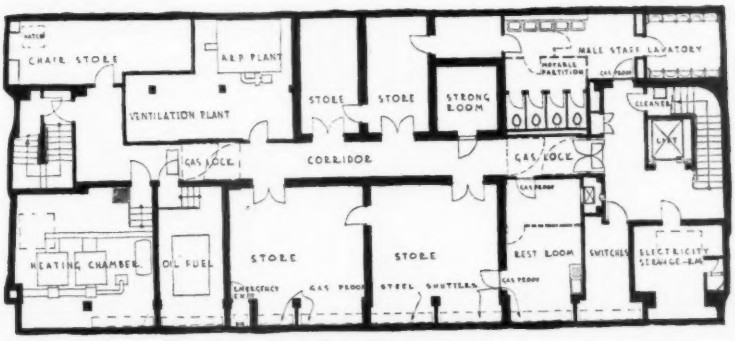
COURT, E.C.

TAIT AND LORNE

Above : The main entrance with, above it, a coloured and gilded bronze coat of arms designed by Walter Gilbert. The etched and cut glass fanlight designed by John Hutton shows the sailing ship Cutty Sark.
Right : The entrance hall.



GROUND FLOOR PLAN

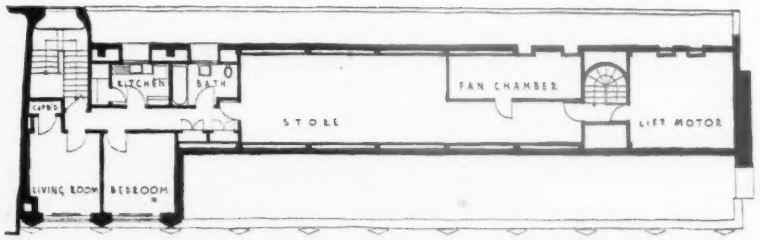


BASEMENT PLAN

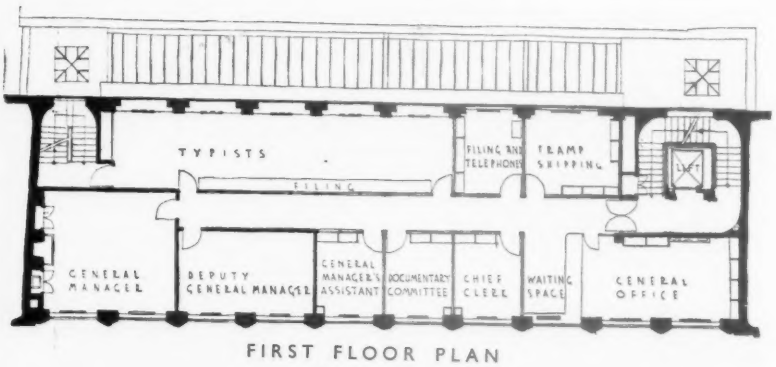
together with offices for the permanent executive staff. The latter occupy the first and second floors. On the ground floor is the Council chamber, the President's room and Library. The basement is designed as a fully equipped gas-proof air-raid shelter.

OFFICE BUILDING, BURY COURT, E.C. • DESIGNED

The council chamber



FIFTH FLOOR PLAN



FIRST FLOOR PLAN

BY SIR JOHN BURNET, TAIT AND LORNE

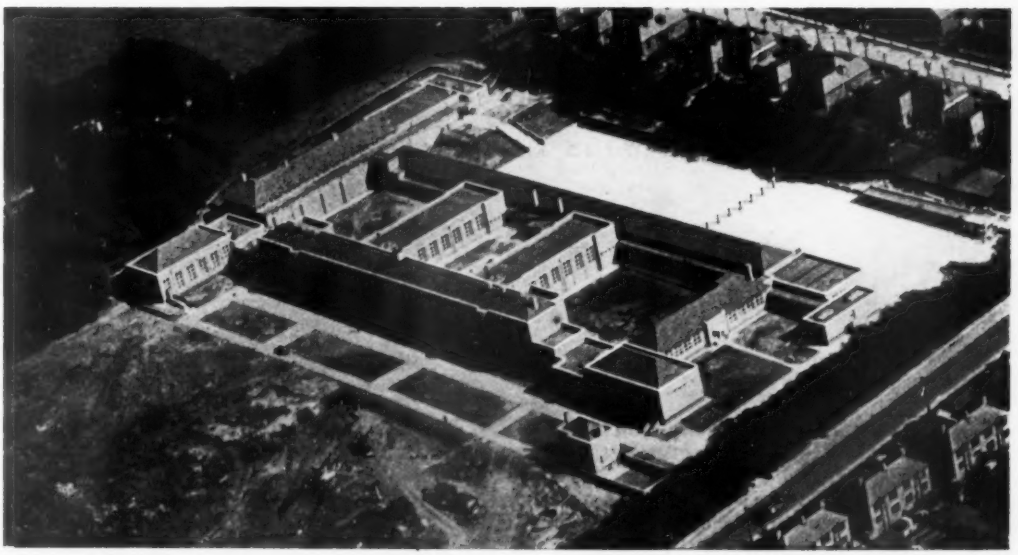
CONSTRUCTION AND EXTERNAL FINISHES—Steel frame, with Portland stone facing on the street elevation. The office floors are subdivided by dwarf partitions 3 ft. high with screens above glazed with clear glass.

INTERNAL FINISHES—The entrance hall is lined with Lunel Rubane marble to a height of 8 ft., and this material is continued as a dado on the staircase to first floor level. The hall is lit with an Orrefors cut and polished crystal fitting presented by the Swedish Shipowners' Association. The corridor leading from the entrance hall to the council chamber is panelled in oak. The council chamber is panelled in natural coloured English oak. The oak carving throughout the council chamber, and the coat of arms behind the President's chair, were executed by E. J. and A. T. Bradford. The furniture was designed by Gill and Reigate and carried out in figured walnut. The library and President's room are also panelled in oak.

Below, left : Lift entrance at second floor level. Right : Offices on the second floor.

SCHOOL AT SOUTH SHIELDS

DESIGNED BY T. A. PAGE, SON AND BRADBURY

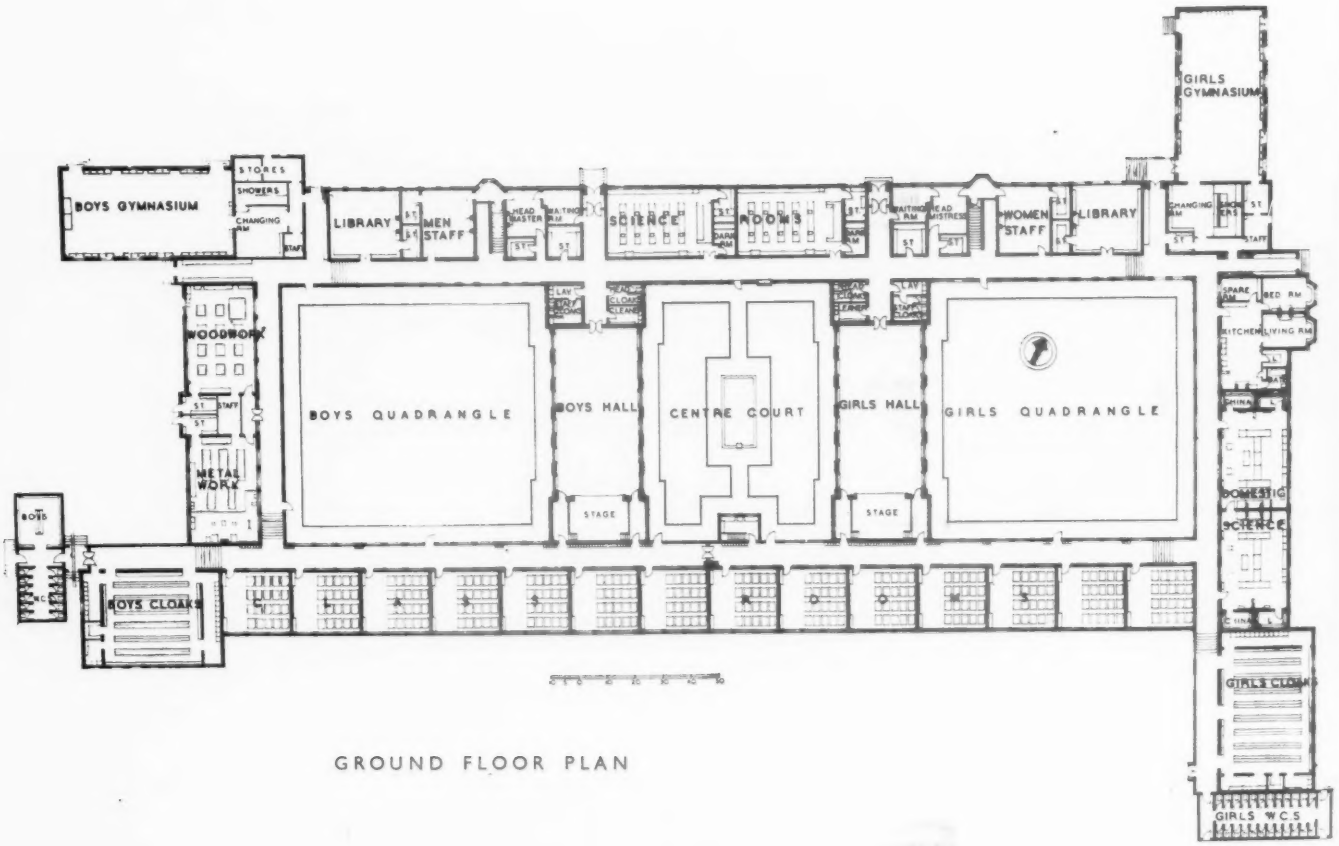


South elevation.

Central quadrangle.

Boys' gymnasium and woodwork block.

SCHOOL AT SOUTH SHIELDS • DESIGNED BY



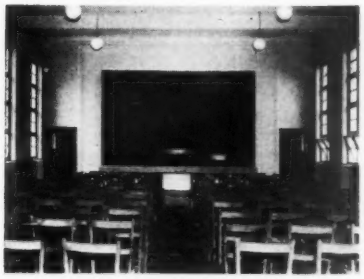
GROUND FLOOR PLAN

GENERAL—Senior Elementary School for 440 boys and 440 girls to serve the needs of children in the new Cleadon housing schemes built by the South Shields Corporation. The desire of the Education Committee to keep the two units together under one roof dictated the quadrangle plan.

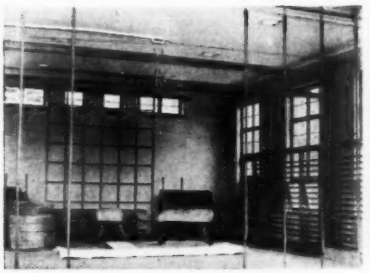
SITE—The site, of seven acres, is closed on two sides by the grounds of a sanatorium and on the third side by houses. The west side of the site is open to the main road from South Shields to Sunderland. Site rises steeply from west to east, and the eastern end of the school has been built at a higher level. Three sides of the building are single storey ; the north block is two storeys in height with the special classrooms, art rooms, and medical inspection rooms on the first floor, overlooking the playing fields. The playing fields are on two levels, one for boys and one for girls.

CONSTRUCTION AND FINISHES—Walls of brickwork built with two-inch cavities. Facing bricks are warm yellow in colour with a fairly smooth finish. The base course is of a dark russet

Girls' assembly hall.

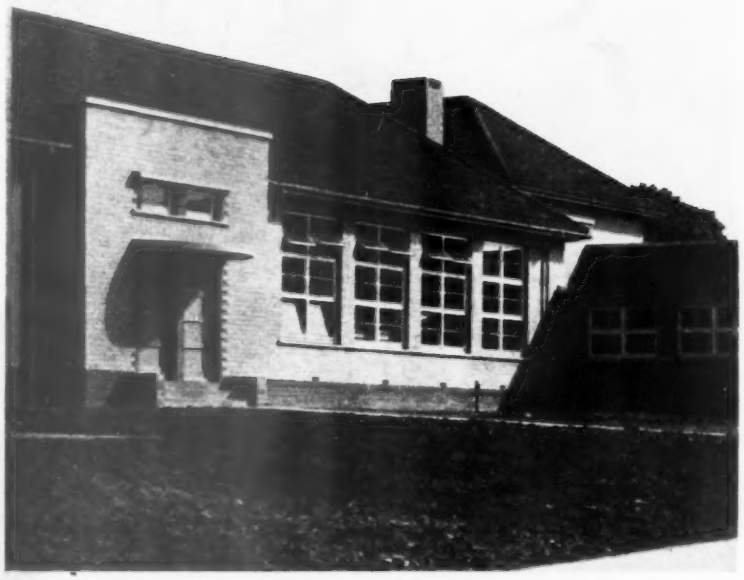


Boys' assembly hall.



T. A. PAGE, SON AND BRADBURY

Top, boys' gymnasium. Centre and bottom, two views of the domestic science room.



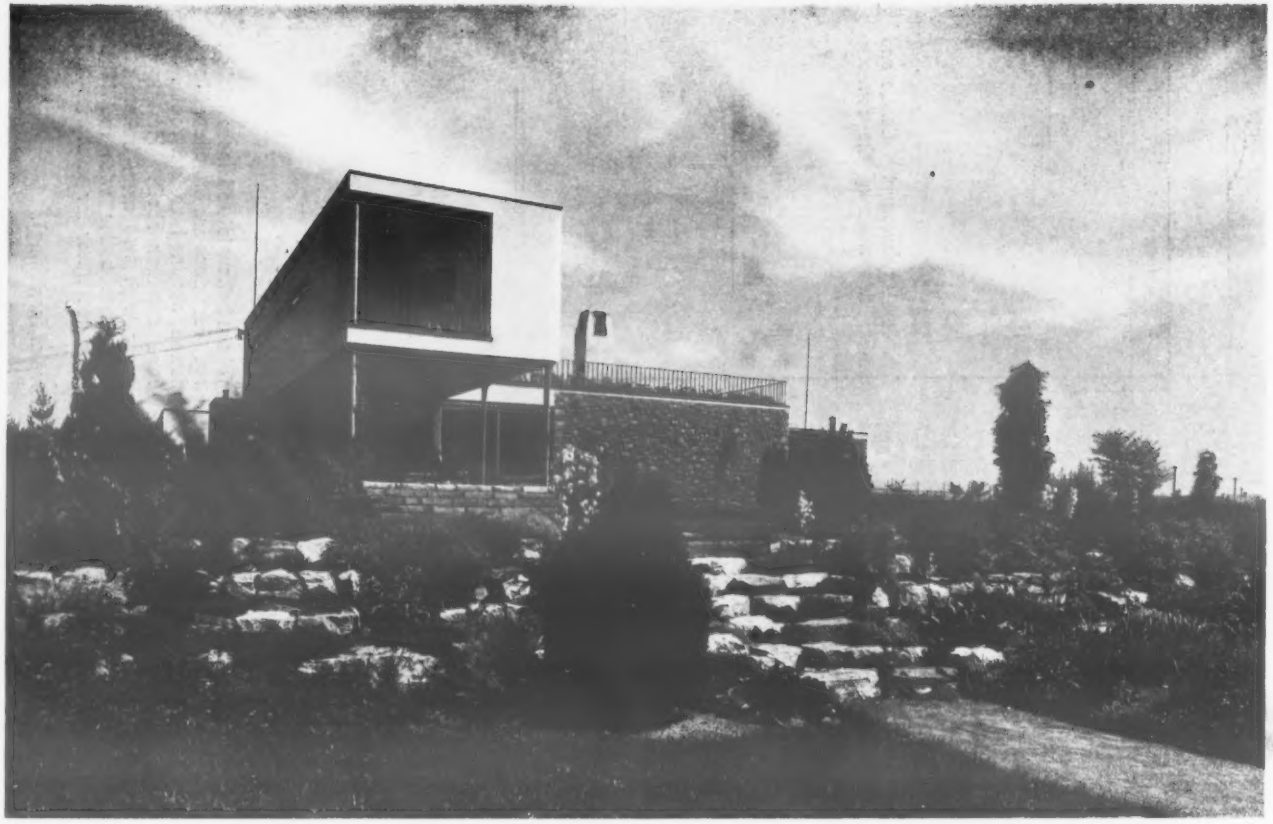
Top, entrance to the metalwork and woodwork block. Left, north elevation.

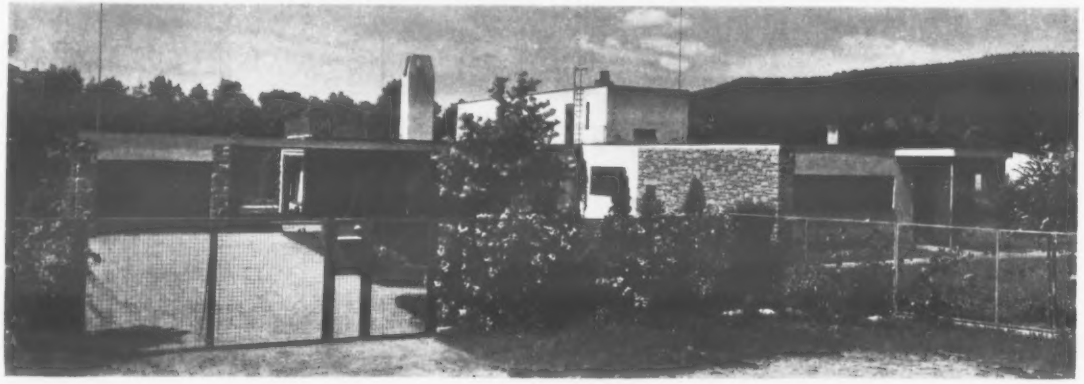
rustic brick. Roofs, of red sand-faced pantiles, have steel trusses. Flat roofs are joisted and boarded. Windows are of wood instead of metal owing to danger of subsidence due to colliery workings. Internally the corridor walls are faced with the same bricks as the exterior, and corridor floors are of concrete flags in grey and buff colours laid in chequer-board pattern. Classroom walls are plastered and finished with gloss paint dadoes, and the floors are finished with Jarrah blocks. Domestic science section has teak block floors and the gymnasiums have hollow joisted floors finished with Gurjun strip flooring. Partitions are of hollow tiles.

SERVICES—Cross ventilation obtained to classrooms by clerestorey lighting above corridor roofs. Heating is by low pressure hot water with two main boilers fed by automatic stokers. Separate boiler with individual electric stoker for domestic hot water for lavatories and domestic science rooms.

COST—£60,540 (exclusive of furnishing).

COUNTRY HOUSE IN BOHEMIA

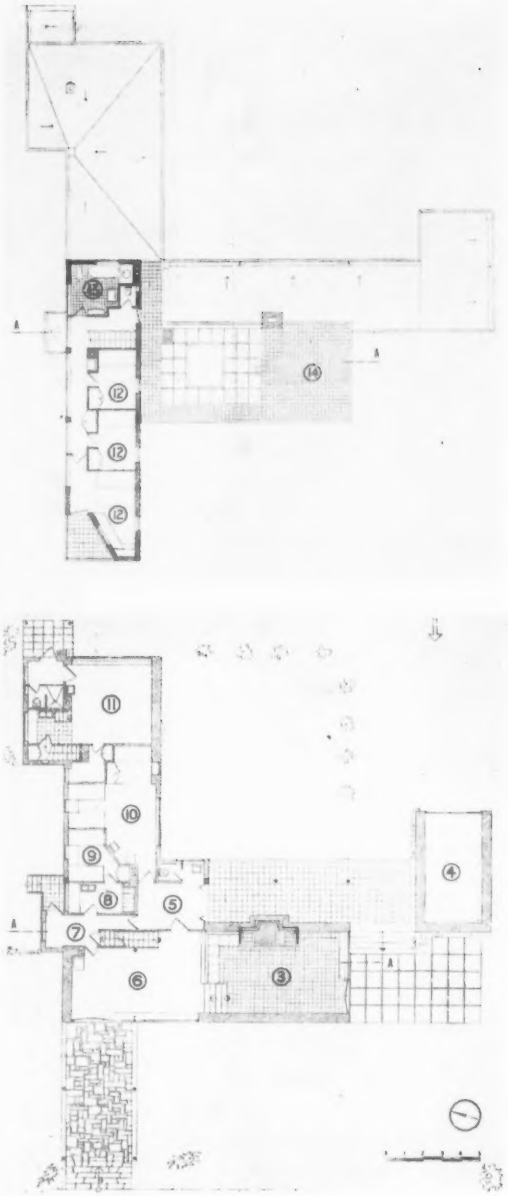




KEY

1 : Cellars
2 : Boiler house
3 : Living room
4 : Garage.
5 : Entrance hall
6 : Dining room
7 : Servery and back entrance hall
8 : Kitchen
9 : Maid's bedroom
10 : Bed-sitting room
11 : Gardener's bungalow
12 : Bedrooms
13 : Bathroom
14 : Roof garden

Top, view from the west with the stone wall of the living room on the right. Left, view from the road, on the east side



Ground and first floor plans

GENERAL

terrace, with a small pool. The " bungalow " contains a bed-

Left, view from the road, on the east side

Ground and first floor plans

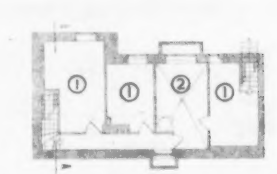
GENERAL

This is a house in two parts : a family house and a " bungalow " for the gardener.

The house proper has its entrance at the end of the loggia that connects the main building with the garage. It contains a living-room, with open fireplace, separated from the dining-room only by a change in floor level and a dwarf partition. At the rear entrance a service pantry is formed between the kitchen and the dining-room. The maid's bedroom is on the ground floor, approached through the kitchen. Between the house and the bungalow is a bed-sitting-room for an old member of the family. On the first floor are three bedrooms, a bathroom and a w.c. Over the living-rooms there is a roof terrace, with a small pool. The " bungalow " contains a bed-sitting-room, kitchen, and w.c. It has its main entrance and entrance hall on the road side, and its only connection with the house is through the cellars.

CONSTRUCTION AND FINISHES

The ground floor is constructed mainly with solid stone walling built with stone from a quarry near the site. The first floor is built with a reinforced concrete frame, supported in parts on stone walling and elsewhere on circular steel columns. The infilling between the frame members is formed with hollow concrete blocks, rendered on the outside with a slightly rough cream-coloured plaster.



Basement plan

D E S I G N E D B Y
J. F R A G N E R

The entrance loggia looking towards the garage. Left, living-room.

THE ARCHITECTS' JOURNAL

INFORMATION CENTRE

Telephone Enquiries.

Please note that the Information Centre's number has now changed to:

REGENT 6888

If you want an answer to any question about building or architecture, send it to:

The Information Centre,
The Architects' Journal,
45 The Avenue,
Cheam, SURREY.

Telephone - - - - VIGILANT 0087

or ring the Architects' Journal Information Centre at

REGENT 6888

THE Information Centre was begun soon after war broke out to help architects to deal with the difficulties of A.R.P. and other immediate problems. After five months the JOURNAL *believes the need for the Centre has grown, rather than diminished.*

Building is being carried out by new organizations and methods under many controllers of materials. Architects are either busy in new jobs on new problems, or are looking for such new jobs; and as more vacancies occur, information about the nature and scope of the work involved will be needed at short notice.

Similar changes in the industry will continue throughout the war; and so, the JOURNAL *believes, will the need for an Information Centre for all questions about building and architectural practice.*

It should be specially noted that the Centre, though started in an emergency, will answer building or architectural problems of all kinds, and not only those connected with wartime building and A.R.P.

Some Questions answered this week:

Q174 CROYDON.—*A contractor had thought out for himself alternatives to all materials of construction normally carried out in timber with the exception of SCAFFOLD BOARDS, and enquired what possible alternatives existed.*

Steel scaffold boards are available, and are now very much in demand. These are of pressed steel with turned down edges, and are of the usual scaffold board dimensions—9 in. by 1½ in. and in lengths up to 10 feet.

Two firms produce these steel scaffold boards,* but deliveries, we are informed, are some ten to twelve weeks in arrears.

Q175 S.W.—*An enquirer asked for the name of the manufacturers of WELD-MESH.*

Messrs. British Reinforced Concrete Engineering Co., Ltd. Their new address is Irwin House, Detillens Lane, Limpsfield, Oxted, Surrey.

Q176 NEWCASTLE.—*A firm of contractors enquired as to the name of the manufacturers of AEROCRETE partition blocks and whether they are now available in London.*

From enquiries made, it would appear that the only address from which this firm is now operating is:—Aerocrete, Ltd., Gartlea Works, Victoria Road, Airdrie, Nr. Glasgow.

Q177 LAMBETH.—*An architect enquired as to what form of board would BEND READILY ROUND A 2 FOOT RADIUS. The work was such that the board chosen must be obtainable quickly and easily.*

It might be possible to carry out this work in one of the thin hardboards, but it could be done by using two or more layers of thin plywood. Plywood of, say, 1/16th in. thickness would bend easily round the radius required, and two, three or more layers could be applied as desired.

Q178 DERBY.—*The Architects' Department of a Public Authority was contemplating the use of SAND-FILLED CONCRETE BLOCK construction in lieu of sandbagging and enquired as to the necessary thickness of the composite construction to meet the standards of protection set out in A.R.P. Handbook on Structural Defence.*

While the construction contemplated is of a composite nature, the elements

* *Scaffolding (Great Britain) Ltd., 344, South Lambeth Road, London, S.W.8. Steel Scaffolding Co., Ltd., 80, Regent Street, London W.1.*

— sand and concrete — are given specific thicknesses of 30 in. and 15 in. respectively in the table on page 24 of the Structural Defence Handbook. From the wall thickness of the concrete unit and the depth on bed of sand in each space, it is possible to assess the protection given by one filled block either in terms of sand or of concrete, then to calculate the number of filled block thicknesses necessary to give the degree of protection stipulated in the Handbook.

Q179 CHATHAM.—*The estate department of a property-owning company enquired as to the nature of the solutions for application to new timber used in reinstatement work after an OUTBREAK OF DRY ROT.*

In the past, solutions of corrosive sublimate have been used for this purpose, but more recent investigation by the Forest Products Research Laboratories has shown that a good quality creosote is one of the best preservatives against dry rot, and should be used for all external work. There are, in addition, various efficient proprietary preservatives prepared from tar oils which are somewhat cleaner and of less pungent smell than straight creosote, but they are, of course, more costly. Where there is objection to the smell of creosote—as in a cold store used for food—or where there is risk of its coming into contact with paint or plaster, a water soluble preservative should be used. Sodium fluoride, which is the principal ingredient in several proprietary mixtures, is one of the most effective salts used for the preservation of wood in buildings. It should be applied at a concentration of about 4 per cent., i.e., 6 oz. of the commercial salt dissolved in a gallon of water. Acid magnesium silicofluoride, at a strength of 8 oz. to the gallon of water (equalling a 5 per cent. solution) is very efficient against dry rot fungi, and is recommended for treating infected brick or stone work, but care must be taken to prevent this solution coming into contact with glass or metal, which it corrodes. Wood treated with either of these salt solutions may be painted over after it has dried. In cases where a tar oil preservative is unsuitable, and where the use of aqueous solutions may also be undesirable, a preservative consisting of a toxic substance dissolved in a liquid such as white spirit or solvent naphtha may be used. These notes are contained in a leaflet on the subject issued free by the Forest Products Research Laboratory from their address at Princes Risborough, Bucks.

Q180 FULHAM, S.W.—*An architect enquirer had tried unsuccessfully to make telephone contact with the TENTEST FIBRE BOARD CO., LTD., with a view to using their fibre insulation board and patented forms of roof clipping on work in which he is interested. His failure to make contact with the firm led him to enquire whether other such systems of fixing insulation boards were available.*

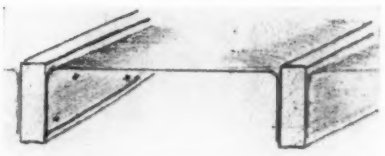
The firm, Tentest Fibre Board Co., Ltd., are still operating, but have removed to an emergency address at 75 Crescent West, Hadley Wood, Barnet, Herts, and telephone number Barnet 5501-2, and no doubt communication with that address will eliminate the necessity of searching for firms doing similar work.

Q181 DERBY.—*The enquirer requested the names of manufacturers of liquids for FIREPROOFING TIMBER by brush application.*

By mere surface application it is difficult to visualize just how timber can be "fireproofed," as under the action of continued heat from a fire timber will shrink and split, and so give the flames access to untreated parts. Even with pressure impregnation, timber can only be regarded as "Fireproof" in that, under the action of fire, it will char but not glow, and so cannot support combustion. With these reservations, therefore, we give names* of suppliers of paints and colourless liquids for fireproofing timber.

Q182 GREENWICH.—*An architect engaged in HOUSING WORK has a house in course of erection, and the builder is able to procure only half the timber required for joists, etc. The architect wished to know of any form of construction by which he could use the joists at double the spacing normally employed.*

It is suggested that the most feasible means of carrying out the work with the limited amount of timber available would be by making, in effect, flitch beams of the joists by using pressed metal troughs running between the joists and bolted through at intervals as indicated in the sketch. In this way the steel sheet would add materially to the rigidity



of the structure, and also reasonably limit the deflection of the joists. At the same time, it must be recalled that approval of this form of construction would have to be obtained from the District Surveyor or Authority.

Q183 YORKSHIRE.—*A firm of architects inquired whether it was possible to give the proportion of labour and materials in the work carried out on a BUILDING LEFT UNFINISHED because of the war.*

It is possible to arrive at approximate costs of labour and materials on any building job, but the work done must first be valued under the different trades. There are constants of fair accuracy of proportion of labour to materials, but pertaining only to separate trades. Since the cost of the work under various trades must be known to the quantity surveyors, it was apparent that the information required would be readily available from them.

Q184 MIDDLESEX.—*Inquiry was made as to the names of firms marketing types of BURGLAR ALARMS which dial 999.*

These are available from the firms given in the footnote.*

Q185 SOUTHEND.—*A firm of subcontractors telephoned about a dispute which had arisen between them and the general contractor. The work by the subcontractors, which was CEMENT SCREEDINGS, had been priced originally as follows:—*

(a) $\frac{5}{8}$ *in. cement screed under wood block flooring 1/1 per square yard.*

(b) 1 *in. cement screed under jointless flooring 1/2 per square yard.*

Circumstances had arisen which necessitated a 1 in. thickness of screeding

PAINTS.—Messrs. Porcella Products, Ltd., Chase Road, London, N.W.10. Messrs. Griffiths Bros. & Co. (London), Ltd., Macks Road, Bermondsey, London, S.E.16.
LIQUIDS.—Messrs. Blundell Spence & Co., Ltd., 9 Upper Thames Street, London, E.C.4.
PLASTIC.—Messrs. I.C.I. (Casebourne) Co., Ltd., Imperial Chemical House, Millbank, London, S.W.1

Burgot Alarms, Ltd., 26, St. Bride Street, London, E.C.4: Messrs. E. Shipton & Co., Ltd., Ferndown, Pinner.

under wood block floors and in the settlement of accounts between general contractor and sub-contractor, the latter was being allowed only 1/2 per square yard for this 1 in. thickness screeding under wood blocks—a price similar to that put in by the contractor for 1 in. screeding under jointless floors.

At the outset we must make it abundantly clear that the opinion of the Information Bureau, even if expressed, would not be likely to assist the sub-contractor, and that, in a building contract, in the event of a dispute, it is usual for the dispute to be referred to an arbitrator for decision. We quite appreciate that some little trade knowledge would be necessary in determining the relative rate of 1 in. screed under wood block, and a similar screed under jointless flooring. In the former, the screed has to be finished fair of surface, whereas in the latter circumstances, since the jointless floor is in itself laid in plastic form, the underlying screed need not be floated smooth, and, technically, is better left rough, since in that form it provides a better key for the superimposed jointless flooring.

CURRENT PROBLEMS:

TEMPORARY & SEMI-PERMANENT BUILDINGS

BY EUGENIO FALUDI AND GODFREY SAMUEL

7: FINISHES

DOORS AND WINDOWS

I. Introduction

In the previous articles we have considered the general structural problems of temporary and semi-permanent building; frames, roofs, walls, floors, and foundations, in different materials. In this article we shall deal with some of the finishing details, those concerned with doors and windows.

The proper finish of openings is at least as important as a proper structural design. From the user's point of view it may even be more important. Yet it is precisely in this matter that most mistakes are made, more often from a misguided attempt to economise. The successful solution of the small practical problem is seldom necessarily expensive.

II. Openings

A. General

The size of the opening for a door or window is determined by—

(i) The volume of the building and its use;

(ii) The standard sizes of doors and windows, since these should be adopted for economy, wherever possible;

(iii) The standard width of finishing materials, and in the case of narrow (e.g. 4 ft.) prefabricated panels, the width of panel, since narrow strips of finishing material are undesirable.

Suggested sizes are: 2 ft. 6 in., 4 ft. and 5 ft. (double), 2 ft. 3 in. and 3 ft. 7 in. (for standard studding).

B. Frame and Stud Walling

Both door and window openings are usually placed centrally in a bay or, if there are two, symmetrically. This is partly the outcome of standardized planning, partly of standardized bracing of the panel. Sometimes it may be of structural advantage to place a door against a stud, or of economic advantage to adjust the position of a window to a standard size of sheet material. With an opening clear of main structural supports, subsidiary studs are required. These may be run the full height and the lintel and (in the case of windows) cill set between. An economy in timber can be made by stopping the studs at lintel level and securing the whole to the eaves beam by wires in tension.

Door and window frames can be of either wood or metal; we shall first consider wood.

It is, of course, unsatisfactory to hang doors or windows on the structural frame of the opening, although for doors to very small temporary stores and similar buildings this can be done; in such cases a ledged and braced door is best, as it will take up small movements, the fastening being of the Suffolk latch type. Generally a closer fit is required, and the inevitable movement in the structural members makes it impossible with such a system.

A door or window frame is therefore required. This should be designed as far as possible for standard sizes of timber. It can be of various types:

1. *Rectangular section with planted stop.*

This is cheap, but hardly weathertight and only acceptable for such buildings as stores or garages. If used with studding, it can be as thin as $\frac{7}{8}$ in. with a $\frac{1}{2}$-in. stop.

2. *Rebated frame*

This is satisfactory for most purposes where weather boarding or sheet finishes are used. The least thickness desirable is $1\frac{3}{8}$ in.

3. *Twice rebated frame*

This may be useful on large works where mass production is called for if some doors are required to open in and others to open out.

4. *Rebated or twice rebated and once or twice grooved*

This is sometimes useful with projecting frames when rendering and plastering, or either of them, are used, or with such sheets as asbestos cement or plasterboard where there is negligible movement. It allows a neat finish without cover-moulds, but if there is likely to be any buckling, a cover-mould alone should be used as it takes up the movement more easily.

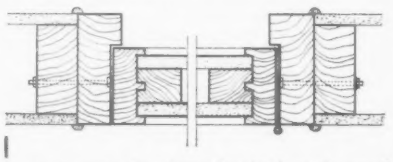
These frames may be of different depth, depending on the finish to the surrounding wall:

1. *Projecting both sides*

The advantage is a better finish, the disadvantage more material, but in many cases the extra cost will be justified. In the case of hard sheet materials and vertical boarding, the facing material is finished to the frame by means of a groove or cover-mould or both, according to the standard of weather protection required. In the case of rendering, a groove is almost essential. In the case of horizontal weather-boarding, a good butt joint with building paper or felt nailed to the frame may be satisfactory for more temporary work; alternatively with feather edge boarding a saw-tooth cover-mould can be provided, but even though two can be cut from a board, the method is expensive.

2. *Flush both sides* (Fig. 1)

This is generally the cheapest method,



Flush frame for door finished with wood wool sheeting.

but weather resistance is clearly less satisfactory. It should not be used with horizontal weather boarding. The joints

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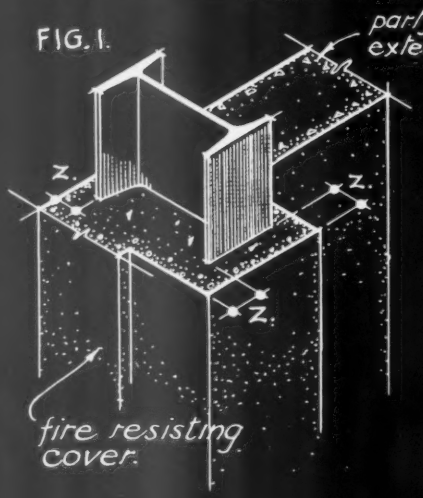
ISOMETRIC DETAILS SHOWING FIRE RESISTING COVER TO STEEL COLUMNS

Dimensions Z, Z_1, Z_2, Z_3 may be varied in certain cases, see notes on reverse of Sheet.

FIG. 1.



COLUMNS IN PARTY AND EXTERNAL WALLS.

See clauses (a) and (b) on the reverse of this sheet.

Z. must not be less than 4. ins.

FIG. 2.

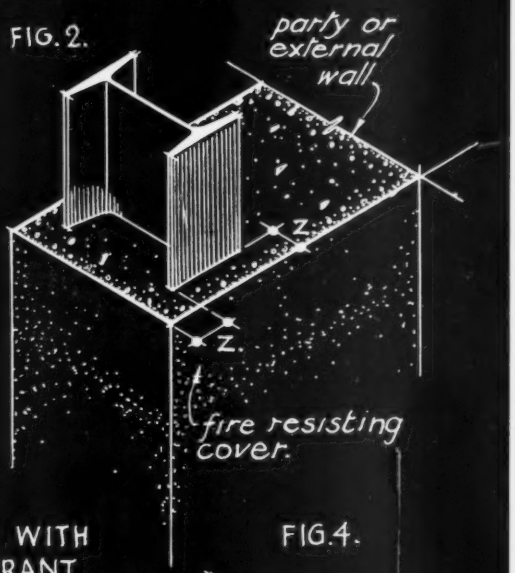
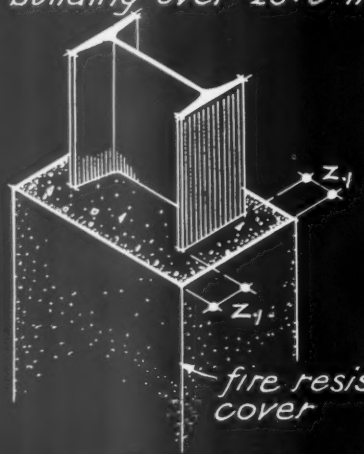


FIG. 3. INTERNAL COLUMN, *in 2 storey building, or building over 25'-0" high.*



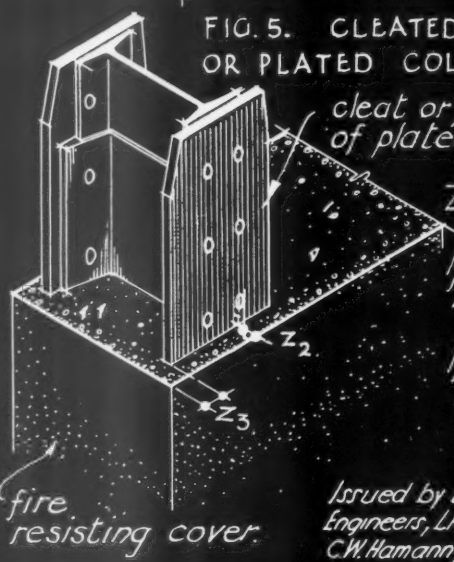
See clauses (a) and (b) on reverse of this sheet.

Z_1. must not be less than 4. ins.

CASING WITH RE-ENTRANT ANGLES. FIG. 4.

for party or external walls 4. ins. for internal columns 2. ins.

FIG. 5. CLEATED OR PLATED COLUMNS.



Z_2. must not be less than 1. in. If cleat:
Z_3 must not be less than 1. in. If plate:
Z_3. must not be less than 4. in.

GENERAL NOTES:

For simplicity, the cover has been shown in relation to a plain joist column.

the requirements apply equally to other column sections, such as channels, plated joists, angles, etc.

the casing must be hard against the steel wilhout any voids, and is to consist of brickwork, terra-cotta, concrete, stone, tiles, or other equally incom-bustible material, or of a combination of these.

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INFORMATION SHEET : STEEL FRAME CONSTRUCTION : No 18.

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INFORMATION SHEET

• 776 •

STRUCTURAL STEELWORK

Subject : Fire resisting cover for steel columns

General :

This series of Sheets on steel construction is not intended to cover the whole field of engineering design in steel, but to deal with those general principles governing economical design which affect or are affected by the general planning of the building. It also deals with a number of details of steel construction which have an important effect upon the design of the steelwork.

Both principles and details are considered in relation to the adjoining masonry or concrete construction, and are intended to serve in the preliminary design of a building, so that a maximum economy can be obtained in the design of the steel framing.

This Sheet is the eighteenth of the series, and illustrates the minimum dimensions of fireproof casing for steel columns.

Regulations :

By-law 68 of the London County Council's Building By-laws, which came into operation in January, 1938, sets out the standards for the fireproofing of structural steelwork. These standards are generally acceptable throughout the country, as are also the other building by-laws of the London County Council. Waivers of the requirements are freely granted by the Council in favour of the reduction or the entire omission of the fire cover ; but satisfactory reasons why the requirements should be modified must, of course, be put before the Council in each particular case. The Council have also published a document, "Fire Protection for Structural Steelwork : Application for Modifications or Waivers," which sets out the requirements for fire tests, the results of which would determine, in many cases, the permissible reduction in fire cover.

As the test prescribed for proving that the material is sufficient for fire protection does not make any distinction between internal and external columns, it has become quite usual to accept the dimensions of the casing set out for internal columns (Fig. 3) as sufficient for external columns also. A waiver is to be obtained for this in every case.

Encasing of Columns :

Except in a single-storey building, not higher than 25 ft., in which there is no structural steel in any party or external wall, every structural steel column must be protected against the effects of fire by a casing of incombustible materials. The casing is to consist of brickwork, terra-cotta, concrete, stone, tiles, or other equally incombustible material, or of suitable combination of these. Portland cement mortar must be used for the bedding and jointing of all materials which are in the form of blocks, and all joints must be completely filled. Casing must be hard against the steel without any intervening voids, and the thickness must comply with that given for the appropriate case in the following paragraphs :

(*a*) Columns in party and external walls : on all flanges and webs of every column wholly or partly in :

(i) an external wall, or

(ii) a recess in a party wall, not less than 4 in., except on protruding cleats and rivet heads where the casing must be not less than 1 in. (See Fig. 5 on the front of this Sheet.)

(*b*) All other columns : on all flanges and webs, not less than 2 in., except on projecting cleats and rivet heads, where the casing must be not less than 1 in. (See Fig. 5 on the front of this Sheet.)

Re-entrant Angles :

There is no restriction on re-entrant angles in the casing, which therefore may be made to follow the lines of the section encased. This is not to be recommended, nor has it any economic advantages, but in certain special cases it may be necessary. (See Fig. 4 on the front of this Sheet.)

Reference :

The explanations of the by-law requirements above and Figs. 1, 2 and 3 on the front of this Sheet have been taken from "Building Design and Construction," Volume I, by F. J. Samuely and C. W. Hamann, and reprinted here by permission of the publishers, Messrs. Chapman and Hall.

Previous Sheets :

Previous Sheets of this series dealing with structural steelwork are Nos. 729, 733, 736, 737, 741, 745, 751, 755, 759, 763, 765, 769, 770, 772, 773, 774, and 775.

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can be covered in the various ways discussed in Article III.

3. *Projecting one side, flush the other.* (Fig. 2.)

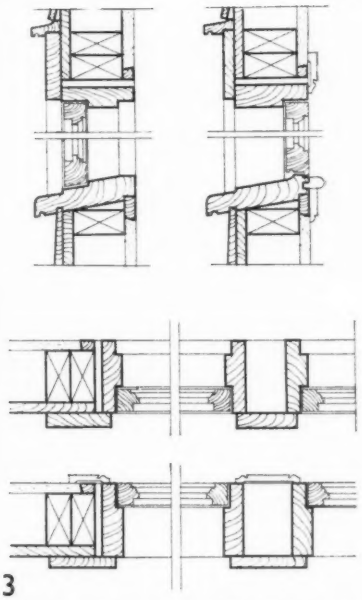
If the projection is on the outside, this may be the best all-round solution for normal finishes. In certain cases, e.g. external vertical boarding and internal soft-board, the reverse arrangement is also satisfactory.

4. *Recessed inside, projecting or flush outside.*

This allows a saving in timber for mass production, but the need to turn the internal finish into the reveal probably cancels any saving in cost. An external recessing is possible with rendering, the surface being rounded off and finished with a cover strip; the frame should not be recessed beyond the face of the lathing, as the stud must then be rendered and the expense of wire mesh or some similar complication incurred.

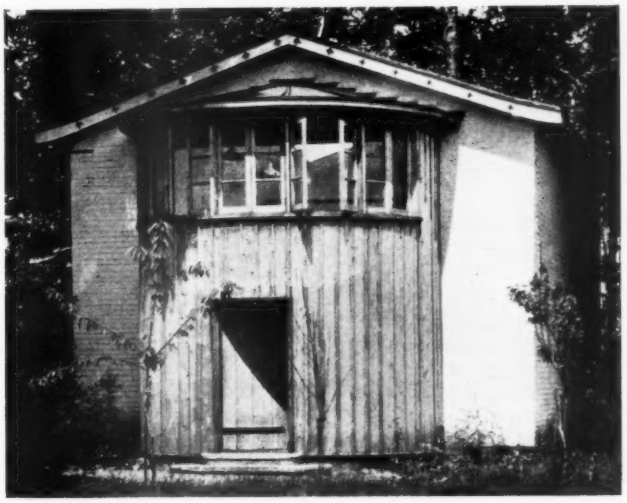
2

Projecting door frame with horizontal boarding. (E. Faludi, Italy.)



3

Windows, opening in and opening out, with external horizontal boarding and internal plaster.



Curved window with vertical boarding. (Osman, England.)

4

CILLS TO DOORS

External doors are more convenient if they open inwards, but where they are designed principally for escape, they should open outwards. The detail of the threshold depends chiefly on which alternative is chosen. Only in the cheapest and most temporary kind of work should the sole plate be used as a threshold with planted stop. A separate member framed in with the jambs with a thoroughly watertight joint is preferable. Where the sole plate is below floor joist level, this cill is fixed straight on to the joists, and where doors are much used, it is advisable to notch it in flush with the floor surface. Where the sole plate is above joist level, it must either be cut, sometimes undesirable for structural reasons, or the cill must be fixed over it, giving an excessive obstruction. Where many doors are required, sole plates below joist level are preferable.

In order to give proper weather protection to the supporting member below, external thresholds must project beyond the general wall face, but the inside face should be flush with that of jambs and head, projecting beyond, flush with or recessed behind the internal wall face, as the case may be.

Water bars, or such devices as metal sheeting fixed below the drip, are unnecessary unless there is some brick or concrete step immediately below the cill allowing water to collect under it.

All cills should be rebated, doors opening outwards extending to the lower level, those opening inwards to the upper level. In the latter cases the rebate should be throated where there is a risk of driving rain. All cills should be weathered to an angle of about 7 degrees or more. A throating under the drip is, of course, always necessary.

While jambs and head may be in softwood, if adequately protected against the weather by paint, creosote or similar preservatives, all door cills that are likely to receive much wear should be in hard wood, and it is usually a false economy to provide them in softwood.

CILLS TO WINDOWS

Windows can also open outwards or inwards (Figs. 3 and 4). The former is nearly always preferable in temporary work, as adequate weather protection is more easily provided and less inconvenience is caused to what is often bound to be a rather congested interior.

As far as drip, rebate, weathering and throating are concerned, the same observations apply to window cills as to door cills, but in cheaper work a tilted board with planted stop allows appreciable saving in cost. Even a rebated cill can be more cheaply provided, from a smaller section, if the underside is at an angle. Where window jambs and head project, the cill is best stopped flush with the back of the jamb to form a continuous frame. Where jambs and head are flush with the external wall surface or recessed, the cill is best extended two or three inches beyond the back of the jamb. Where jambs and head are flush with the internal wall surface, the cill can either be treated similarly, or, better, kept out an inch or so from the inner face of the window, and a window board provided. This board should be grooved into the cill for its full thickness, or by means of a tongue, and should project an inch or two, extending beyond the clear opening by the thickness of the jamb or something more. Where jambs and head are recessed internally, a window board is essential. It can be $\frac{7}{8}$ in. thick, and a standard width should be used wherever possible. The nosing can be rounded, splayed with rounded

corners or square with rounded corners. The latter two alternatives are preferable when the whole frame projects into the building.

Weather Protection to Head

For doors and windows in buildings of this type a projecting weather mould should be provided to protect the joint between head and lintel. With horizontal weather boarding a tilting fillet for the last board is usually good enough, but care must be taken to make a good joint between the tilted board and the normal boards continuing the course, and the fillet must be kept up from the board edge to provide a drip.

In better work, with boarding or sheet materials, a special member, designed on the same lines as a cill, can be used. If this is in hardwood of adequate thickness, properly rebated, weathered and throated, no covering material is needed.

It is generally more economical, however, to use a tilted softwood board, again at an adequate angle, projecting about 2 in. and covered with zinc or lead in semi-permanent work, or with bituminous felt in purely temporary work. The covering must be dressed over the edge to form a drip.

If felt is used behind the external finish, it can be continued as a covering, otherwise the covering material must be dressed up behind the wall finish about 3 in.

If the external finish is of metal, the weathermould can sometimes be incorporated in the sheet.

Metal Door and Window Frames

Where metal doors and windows are used, metal frames are required. In the case of temporary buildings of stud construction, these can be used in direct contact with steel or concrete studs, provided the latter are rebated to receive them; but it is better, and with wood studs it is necessary, to use intermediate timber frames.

Where metal frames are used without timber, the cill and, if required, the head protection, too, can be incorporated in sheet metal in the frame.

Metal frames may be either of special light steel sections or of pressed steel.

In the present circumstances, already referred to, suitable pressed steel sections should be considered, as less steel is used than in the commoner light Z sections.

C. Block Walling

Where brick or block walls are used, although the general principles of door and window design remain the same as with boarding or sheet materials, certain special problems arise.

It is usually desirable to increase the weather protection by providing a rebate to receive the frame (Fig. 5). Where this is not done, i.e. in cheaper work, or where the wall is too thin, the joint should not only be well pointed in cement and sand, but should be covered with a fillet as well.

Where timber frames project beyond the external wall face, some kind of scrim is advisable. In Italy it has been found that a fabric of jute and metal thread, arranged as an L section in the corner, is a satisfactory solution, especially for wood wool, as it takes up any expansion or contraction in the external finish.

The method of fixing the frame to the infilling material will vary according to the material used.

1. *Brick.*—For wood frames, wood blocks in the courses at about 1 ft. centres can be used, if kept well back, but the possibility of water absorption is reduced by the use of plugs. For metal frames lugs should be welded in the factory, spaced about every 1 ft. 6 in. to suit the courses.

2. *Normal Concrete.*—For wood frames, wood plugs should be cast in the block where possible, or otherwise inserted on the site. For metal frames, lugs are required.

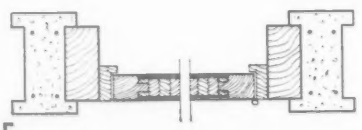
3. *Breeze or Pumice.*—For wood frames in the cheaper type of building direct fixing is sometimes possible as an alternative to methods mentioned above.

4. *Wood Wool.* — For wood frames direct fixing is again possible, but greater rigidity is obtained by the use of large wood blocks, made with the frame and bonded into the walling blocks. Metal frames require lugs.

Where hollow brick or block walls are used, special precautions are required to seal the cavity behind the jambs and head. The vertical seal can take the form of a return to the walling material. Slate and similar materials are suitable for more permanent work; bituminous felt, well secured and the edges kept back for pointing, is adequate in most cases. The horizontal protection to the head or lintel can be in lead or zinc in more permanent work, or again in bituminous felt. In all cases it should be combined with the hood mould covering referred to above. A camber in the direction of the wall is very desirable; a fall to the outside, in the width of the cavity, is essential.

D. Doors

The door itself can be of metal where A.R.P. or fire protection requires it, or where the necessity for extra light requires very thin glazing bars. More usually timber will be used. Standard sizes are, of course, 6 ft. 8 in. by 2 ft. 8 in., 6 ft. 6 in. by 2 ft. 6 in., 6 ft. 4 in. by 2 ft. 4 in., but variations in width with the same height are sometimes obtainable. (A few alternative heights with the same range of widths might prove more useful.)



5

Door frame in pre-cast concrete studs (with intermediate member).

For external doors, framed, ledged and braced are best for general work of this kind, though ledged and braced only are adequate for more temporary purposes. Frames, ledges and braces can be 1½ in. to 2 in. thick, boarding ¾ in. to 1 in. With weather-boarded buildings the same finish can be used in the doors, if need be.

Panelled doors can be used for better work and some dozen standard types are available often as cheaply as framed, ledged and braced. The type with six rails and no muntins is probably preferable for this kind of work.

Flush doors are undesirable outside, but provide a reasonable alternative for interior use, where a specially high standard of cleanliness is required, otherwise the extra cost is unjustifiable.

E. Porches

The use of porches or hoods for external doors is desirable where there is much traffic. They can be formed by extending the roof with columns (Fig. 7) or brackets or as a simple cantilever; or they can be formed at a lower level with any of the various available roof coverings.

F. Windows

Here again standard sizes should be adopted wherever possible. (It is to be regretted that the present standards bear no relation to standard sizes of finishing materials.) Present standards are: Metal: widths, multiples of 1 ft. 7¼ in. plus ¾ in.; heights, 1 ft. to 5 ft. in 6 in. stages, omitting 2 ft. 6 in. Wood: Widths, multiples of 1 ft. 9½ in. plus 2¼ in.; heights, 3 ft., 3 ft. 5 in., 3 ft. 11 in., 4 ft., 4 ft. 3 in., 4 ft. 9 in., 5 ft. 3 in.

In the case of both doors and windows, it must be remembered that metal generally requires more upkeep than wood. With the present timber shortage, however, there may be special advantages in metal. (Fig. 6.)

Windows can be once rebated for glazing only, or twice rebated for extra weather protection to the joint between sash and frame. This is advisable even for temporary work. A groove similar to that in the cill is an advantage to both windows and doors. Lipping, alone or in combination with the rebate, is desirable in the better types of building or in exposed positions. Such further precautions as double rebates are seldom justifiable.

Glazing

For economy in maintenance and strength in wind resistance, large panes are undesirable.

For portable buildings and others

Metal windows with horizontal boarding. (Hening & Chitty, England.) 6

liable to damage, removable glazing may be an advantage. Screwed beads of wood or metal are useful where removal is infrequent, but they are easily spoiled by condensation. Grooved sashes, slotted at the top, with strips of rubber or similar material, can be used; the glass is slid in from the top and protected with another strip.

Another solution for portable buildings is the use of unbreakable substitutes for glass. The type of celluloid material used in car hoods is an example, but it has a lower degree of transparency. As a precaution against damage from blast in air raids, it deserves special consideration.

G. Door and Window Furniture

It is hardly necessary to discuss this subject in detail, since the problems are the same as for permanent work. The advantage of Cremorne bolts for exposed sites may be mentioned, and the present desirability of substituting door handles of plastic material for those of metal.

Porch detail. (Beatty & Shang, U.S.A.) 7

THE DESIGN AND INSTALLATION OF SERVICES IN SHELTERS*

LECTURE BY NORMAN FORSTER

Light

IN unventilated shelters it is essential that the type of lighting chosen should consume no oxygen and should produce as little heat as possible. This, in effect, means that electric lighting of some sort is necessary. In ventilated shelters, the consumption of oxygen is not so important, but it is recommended that electric light be used, although oil lamps may be permitted for short emergency periods.

As to the intensity of lighting in shelters, this, again, is a subject on which there is much controversy. Some people insist on sufficient light for comfortable reading, while others consider a much lower intensity sufficient. In general, I think a reasonable allowance would be 6 ft. candles for working spaces, such as control rooms, and 2 ft. candles for pure shelters.

Electric light may be obtained from the mains, from batteries, or from an independent generating set.

Wherever possible, the mains should be used with either batteries or generator as an emergency stand-by, but in many cases hand lamps are used for this latter purpose and are satisfactory, providing that the batteries are in good condition. Where a battery set is used, it will, of course, be necessary to instal a D.C. circuit of suitable voltage, and the batteries may be kept in a charged condition by means of a rectifier from the mains.

Batteries should be housed in a separate compartment and not in the shelter itself. This battery room should have separate ventilation, but it may be convenient to evacuate air from the shelter through this room.

If a stand-by generator set is used, it is convenient to have this wound so that the current produced will have the same characteristics as the mains, so that the same circuit and lamps can be utilized. In these installations it is useful to include a battery-fed pilot light which is automatically switched on in case of mains failure. This would give sufficient light to enable the generator to be started up without delay.

It is recommended that the prime mover should be of the Diesel type to reduce fire risks from stored fuel. In the smaller sizes air for combustion may be taken from the shelter, but in sizes over, say, 7½ kw., it is better that the air should be taken from outside, it having been proved that gas has very little effect on cylinders and valves, and the relatively large quantity

* *Extracts from a paper last week read before the Air Raid Protection Institute.*

of air consumed would tend to destroy the plenum in the shelter.

The cooling of the engine often presents some difficulty. This may be by tanks or by radiator. Cooling tanks are satisfactory and usually cheaper, but care must be taken to ensure that they are outside the shelter and at the same time well protected. If radiator cooling is used, it is in nearly every case necessary to mount the radiator separate from the engine and provide it with its own fan and ducting circuit—the normal radiator fan not being designed to cope with duct resistance.

The cooling air can be ducted into the shelter through the radiator and straight out again, thus avoiding heating up the shelter. Particular care must be taken to ensure absolutely gastight construction from the fan outlet to where the discharge duct passes through the wall, as this part of the circuit will be under pressure and may contain gas.

It is recommended that the generator set be mounted in a separate compartment of the shelter, but it should not be necessary for the attendant to have to go out of the protected area to reach the generator room. Here, again, air from the shelter can be evacuated through the generator room to ventilate it and limit the temperature rise.

It is normal to arrange the fuel supply from a small service tank mounted on the wall. This can be replenished from time to time from drums of a semi-rotary hand pump. The drums can be stored well away from the shelter.

All points where cables pass through the structure should be rendered gas- and water-proof, either by means of glands or special sealing compound. The circuit should be divided up if possible, to avoid the whole shelter being blacked out in the case of one part being damaged.

Automatic switchgear is not advisable on account of possible damage due to explosion and, in general, the loads involved can be handled with manual switches.

The wiring should, I think, be of the continuous screwed barrel type, with insulated conductors, and should not be cast into the structure, as this would make repair work very difficult. All circuits should be fused separately and a master switch provided in the control room.

The lamp fittings may be of any normal substantial type.

Air Supply

The Home Office has issued recommendations as to the numbers of persons who may be accommodated in shelters with varying air quantities, and has specified the minimum wall surface per person in each case. We can therefore, confine ourselves at the moment to the means for producing the necessary air, circulating it and discharging it from the shelter. These can be divided into natural ventilation, mechanical ventilation and closed circuit regeneration.

Natural ventilation is, of course, the simplest and cheapest, and is the type normally used in surface shelters. This type of ventilation depends for its efficiency on outside air movement and on the air convection currents set up by the heat of the occupants. This means that a standard degree of efficiency cannot be obtained as we have to depend on two variable quantities. Outside wind conditions may be such that no ventilation at all is obtained, and therefore careful thought should be given to the location of inlets and outlets, due consideration being given to the configuration of adjacent buildings, etc. In general, the inlet should be at low level and the outlet at high level, and should be preferably a vertical shaft in order to obtain the maximum chimney effect.

A convenient arrangement is to have the inlet in the main entrance, and the outlet in the lavatory at that end of the shelter remote from the entrance, care being taken that sufficient space is allowed for the air to pass freely into the lavatory to avoid any unnecessary resistance. Both inlet and outlet must be arranged so that they can be closed instantly in case of either the presence of gas or of smoke from some burning building. While most people appreciate the danger of gas entering an air raid shelter, I have been surprised at the large number who have not considered the danger of smoke. If a building was burning to windward of the shelter and the smoke drifted across the shelter and was drawn inside, it would not only cause intense discomfort, but would probably cause panic, as the occupants would, in all probability, be unaware of the location of the fire and would think it was their own building and that they were therefore trapped.

There is not much that can be said in a paper of this sort on the subject of natural ventilation, as site conditions will settle the layout in each case, but the following general recommendations can be made :

(i) Low inlet and high outlet.

(ii) Arrange for maximum chimney effect.

(iii) Inlet and outlet to be arranged so that air movement takes place over the whole shelter and does not leave dead pockets.

(iv) Inlet and outlet to be sited to be well protected from blast, i.e. inlet facing wall in entrance, and avoidance of high chimney for outlet if not protected by adjacent wall.

(v) Closing gear to be fitted to both inlet and outlet.

(vi) As conditions can be materially improved by air movement, disturber fans can be used. These should, of course, be located so that the air movement caused will tend to assist the natural ventilation.

Mechanical ventilation comprises means for supplying a continuous stream of air to the shelter by means of a fan, and the necessary air ducts. The fan may be either power or manually operated and gas filters may be included so that the plant can be run under all conditions.

In the case of mechanical ventilation, we do not have to rely on outside wind conditions and other variable quantities, so that the plant can be designed correctly for the jobs in question and a high degree of efficiency reached and maintained.

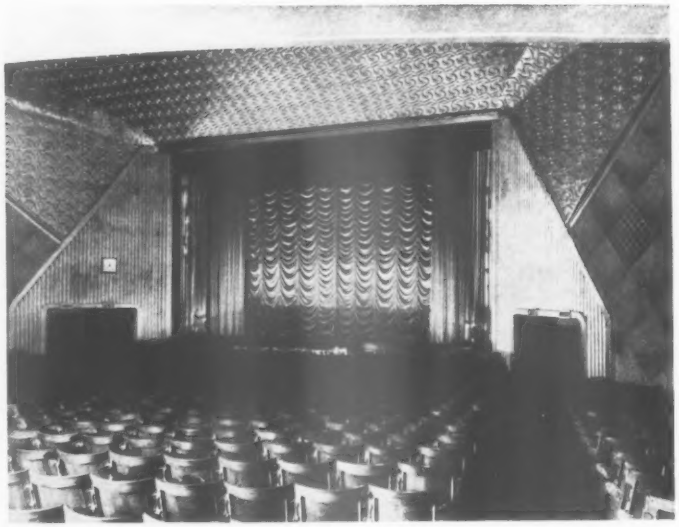
When designing a ventilating installation it is necessary first of all to settle two points :

(i) Air quantity, and

(ii) Whether filters are to be used.

If filters are to be incorporated it is necessary to decide if the air quantity through the filters shall be the same as when the filters are by-passed. This latter point arises due to the fact that the Home Office recommended air quantities are minimum quantities and it may be desirable to maintain those quantities when operating on the filters, but to exceed this quantity when the filters are by-passed. It would, of course, be even better to give higher quantities in both cases, but filters cost money and take up floor space, so it is usual to adhere to the Home Office figures for filtered air.

It is of interest to note that many shelters in which ordinary ventilating plants were fitted last year are now being equipped with filters.



Danilo Cinema, Stoke-on-Trent, designed by A. Glyn Sherwin. View of the stage and proscenium arch showing the Holophane decorative lighting scheme.

Heat

In winter, shelters may require a certain amount of heating but this will generally only be for a short period at the commencement of occupation, as the heat gains from the occupants will soon raise the temperature to a point where cooling, and not heating, is required. Deep shelters closed, and unoccupied, will finally stabilize at a temperature from 50° F. to 55° F. with a high humidity, and heaters will be required in certain cases to dry them out before use.

Due to the rapid temperature rise once the shelter is occupied, it is necessary to choose a form of heater which has the minimum lag. For this reason, pipe heaters are not recommended. The most convenient form is probably the electric heater, which may be used direct—that is, placed in the correct position in the shelter—or may be inserted in the inlet duct of the ventilating plant. This latter method is preferred as it avoids local heating, but it is essential that the heater switch be interlocked with the starter of the fan motor so that the heater cannot be switched on unless the fan is running. The elements of the heater should be fitted with fusible links, and if desired the heater can be controlled by a thermostat through the usual contactors.

Where steam or hot-water heaters are used, the pipes to and from the heaters should break through the shelter wall as close to the heater as possible, to cut down the lag when the heater is turned off. If an operating theatre or first-aid post is incorporated in the shelter, a heater will be necessary for this section, and this should preferably be of the heat-storage type.

So far, the authorities in this country have not issued any recommendations for the cooling of shelters, the present practice being to rely on the conductivity of the walls, floor and ceiling, plus the cooling effect of the ventilating air. Various forms of refrigeration have been tried, particularly abroad, but cost has been a serious deterrent. Cooling alone—that is, without ventilation—is not sufficient, as the rise in CO_2 must be controlled and also the oxygen content maintained. Ice tanks have been proposed, these being of the flat type and thus exposing

the largest possible cooled surface area. I have not heard of any practical experience being obtained, but there is a line of investigation which seems worth while following.

WATER

A good and reliable water supply is essential, and where possible a hot-water service should be provided. As the mains may be fractured, storage capacity should be provided, the location and number of tanks being, of course, fixed by local conditions. It is recommended that the drinking-water supply be kept separate from other services, and if a tank is used which is fed from the mains, a shut-off valve should be fitted which may be closed to prevent contaminated water entering the tank. All tanks should have isolating valves in case of damage. Hot water for decontamination purposes may be obtained from the cooling jackets of the generator engine, where fitted, but hot water for the hospital or first-aid post should be obtained from a separate storage tank and heated either electrically or by means of a stored gas heater.

A sump should be provided in the shelter and a sump pump fitted. It must not be forgotten that this pump must be made suitable for manual drive where no emergency generator is fitted.

All pipes should be fitted with shut-off valves where they break through the shelter walls, and valves should also be fitted so that the various sections can be isolated in case of damage. Hot-water pipes should be kept as short as possible, to minimize heating of shelter.

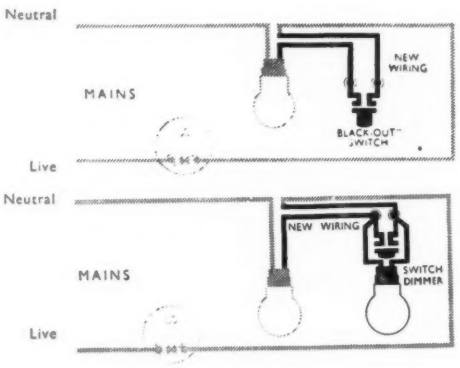
Levels should be so arranged that distribution of water throughout the shelter can be effected by gravity. If this is not possible, a small pump or compressed air system should be used, as no reliance should be placed on the mains pressure. It is good practice to shut off the mains before occupying the shelter.

The following capacities are recommended :

Drinking	½ gallon per head.
Cleansing	1 gallon per head.
General storage ..	5 gallons per head.

These capacities will, of course, depend on local conditions. For instance, the probable percentage of occupants who will require cleansing will vary enormously according to the distance which they must go to reach the shelter, while the facilities for mains repairs, etc., will also vary.

With regard to the cleansing station, it is convenient to arrange mixing valves to the sprays. Hand sprays are probably better than fixed showers, as they can be directed horizontally or upwards as required. It should not be forgotten that a certain pressure is necessary to operate these sprays efficiently, and if a good head is not available a pump or compressed air supply should be arranged. The cleansing station can be arranged to drain direct to the sump mentioned above.



TRADE NOTES

[*By PHILIP SCHOLBERG*]

More Black-out Gadgets

Reference has already been made in this JOURNAL to a black-out switch by Crabtree's, and a two-way door-operated switch by Sanders of Wednesbury was described in these Notes a week or two ago. And now Crabtree's have introduced an automatic dimmer to fit over the front door. It contains its own lamp-holder and shines a low wattage light up on to the ceiling as soon as the door is opened, thus keeping down illumination to reasonable limits, particularly if the door faces another wall or is covered by a porch.

Fixing is quite easy, for the dimmer contains a B.C. lampholder, switch and all the necessary connections in a single unit. All that the wireman has to do is to cut into the live lead at the lampholder and ceiling rose and run twin cable back to the dimmer unit over the door. Since the unit includes a lampholder, the illumination can be varied on the site and reduced to the appropriate intensity. Price is 4s. each complete with door plate and fixing screws. —(*J. A. Crabtree & Co., Ltd., Lincoln Works, Walsall.*)

The Rapid Hardening of Portland Cement

A recent booklet from I.C.I. contains a simple explanation of the effects of calcium chloride when it is used as an accelerator for Portland cement. In the manufacture of normal Portland, gypsum is added to the cement clinker as it comes from the kiln and the two are finely ground. The gypsum has two distinct effects : it slows down the rate of setting by decreasing the reaction rate between the tri-calcium aluminate in the cement and the water ; it also increases the rate of hardening of the set cement by accelerating the rate of reaction between the tri-calcium silicate and the free water remaining in the mass. If no gypsum were present in the cement, a small addition of calcium chloride would have much the same effect. The addition of calcium chloride to cement which contains gypsum however, speeds up both the setting and the hardening, and this acceleration is, under practical conditions, greater than could be obtained by the use of either calcium chloride or gypsum alone.

Owing to a variety of factors, it is not possible to give figures for the increase in strength obtainable by the use of calcium chloride, but it has been found that not only ordinary Portland cement, but also rapid hardening cements are appreciably stronger. In general, it may be said that strength at 24 hours with calcium chloride is roughly equal to strength at 3 days with plain concrete, and at 1 year strengths are still appreciably higher. The table below gives an approximate idea of the effect of adding 2 per cent. of calcium chloride on the compressive strength of a 1 : 2 : 4 concrete made with an average Portland :

Age	Increase per cent.
1 day	120
3 days	50
7 days	25
1 month	14
1 year	6–10

Tests also show that little advantage is to be gained by adding more than 2 per cent. of calcium chloride.

In cold weather calcium chloride has further advantages in that it increases the rate at which heat is evolved from the cement during the early period of hardening, since the acceleration in hardening is due to an acceleration of the chemical reactions, which in themselves generate heat. Tests show that, at low temperatures, concrete which has attained 60 per cent. of its normal 9-day strength will continue to harden in the usual way when normal temperature conditions are restored. The addition of 2 to 3 per cent. of calcium chloride allows these conditions to be fulfilled down to temperatures as low as 23 degrees F. with normal Portland, and down to 12 degrees F. with rapid-hardening, so that concreting need not be stopped during frosty weather. Aggregates, of course, should not be frozen and should be free from ice, and heating of the gauging water and other ingredients is recommended.

In practice no difficulties seem to arise. A 1933 report of the United States Highways Board affirms that reinforcement is not affected in any way, and similar opinions are held in France and Belgium. On the site the calcium chloride can be added in its flake form to the materials in the skip of the mixer, or it may be dissolved in the gauging water, though here the solution must be kept stirred in order to ensure uniformity. Delicate measurements are unnecessary, since the quantity required is not critical.—(*I.C.I., Ltd., Thames House, Millbank, London, S.W.1.*)

British Standard Specifications

One of the difficulties in complying with the provisions of the various regulations and specifications in connection with A.R.P. lighting is that the illumination values are expressed in foot-candles. The measurement of illumination in terms of foot-candles presents no difficulties in properly equipped laboratories, but it is quite a problem to evaluate illumination " on site," particularly

when the level of illumination is of the low order imposed by A.R.P. restrictions. For many purposes it is not required that quantitative measurements should be made, but merely that tests be made to ascertain whether the illumination is in excess of or is less than the prescribed value. With this in view, gauges for checking low values of illumination have been developed, and a British Standards Specification (B.S./A.R.P. 30) has been published. The nominal values of illumination for which gauges are prescribed in the specification are 0.0002, 0.002, 0.02 and 0.2 foot-candle, and means may be provided for enabling more than one of these values to be gauged with the same instrument. The specification aims at ensuring the necessary accuracy combined with portability, but leaves the manufacturer free to develop his own design. An appendix giving notes on the essential parts of the gauges, and on the use of gauges, is included.

Copies of this specification can be had from the British Standards Institution, 28 Victoria Street, London, S.W.1, price 2d. (3d. post free).

D.S.I.R.

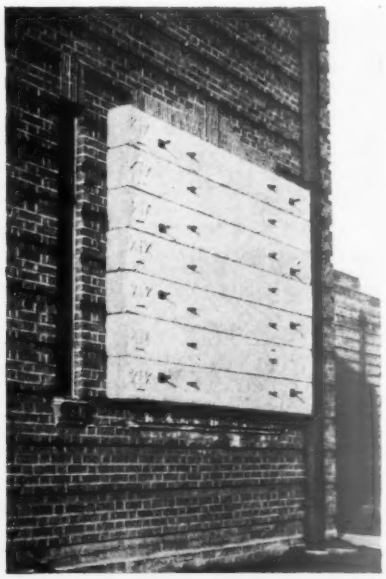
The Creep of Concrete under Load

The Department of Scientific and Industrial Research has issued a further paper (Building Research Technical Paper No. 21, published by H.M. Stationery Office, price 1s. net) in the series of studies on reinforced concrete, which deals with an investigation at the Building Research Station on the creep or flow of concrete under load. Much of the work described was done in co-operation with the Reinforced Concrete Association. The subject was first considered in Building Research Technical Paper No. 12, published in 1930. Since that time, the scope of the investigation, which originally related to the longitudinal movements resulting from loading in compression, has been widened to include creep in pure tension, lateral movements under compression and the effect of creep on the deformation and ultimate strength of reinforced concrete beams.

Some of the test results now published relate to specimens, which have been maintained under load for over seven years. Those for Portland cement concretes indicate in all cases that the creep is proceeding at a steadily decreasing rate, and, for each concrete, is tending to a limiting value. Thus the increase in creep from one to five years under load is only about one-fifth of the movement during the first year for specimens loaded at the age of one month.

A series of simple tests showed that at stresses higher than the normal working values, the creep cannot be assumed to be proportional to the applied stress but the results indicated that the mechanics of the deformation was similar for all stresses. Tests have been carried out to discover the effect of the water content of the concrete, the fineness of the cements, the sharpness of the aggregate, and the preliminary storage on creep. A section of the paper deals with the redistribution of stress in reinforced concrete columns and beams.

To provide an example of the movements that occur in practice as the result of the shrinkage and creep of concrete, measurements were made periodically for over eight years of the vertical and horizontal deformation of one of the reinforced concrete arches of a large hall in London. An analysis of these measurements is included in the paper.



Window protection at the West Middlesex Drainage Works.

Manufacturers' Items

The buildings at the West Middlesex main drainage works contain very important plant, such as generating plant, electric plant, pumps, etc. Consequently, methods have had to be devised for protecting the windows of the structures in which the plant is housed. The following details have been sent to us by the Cement and Concrete Association :

Most of the windows are 8 ft. square, the cills being 5 ft. above the ground. Various methods of protection, all in compliance with the Home Office Code, were considered. Apart from sandbagging, the first idea was to construct earth walls between timber sheeting, but apart from the cost of timber, the amount of earth required to protect the windows up to a height of 13 ft. above ground level was very large, in addition to which the problem of transport arose. The possibility of using steel plates 1½ in. thick was also examined, the cost per window of this method working out to about £40. The following method has now been adopted at a cost of about £8 per window, and Code protection is given. Reinforced concrete beams 12 in. thick, and long enough to span each window opening, are manufactured in moulds at the works ; these units are so made as to be provided with an interlocking device. Reinforcement of ½ in. and ⅝ in. bars is used. The beams are usually 10 ft. long, which provides an overlap of 12 in. at each end of the 8 ft. window. They are 12 in. thick where they cover the opening and 9 in. where they take their bearing on the brickwork. The standard height of each is usually 13¾ in., but occasionally it is necessary to make a beam of special size in order to complete the protection of the opening. In erecting, the bottom beam is placed on a fillet of timber which rests on the window cill. Fixing bolts, ⅝ in. dia., pass through holes left in the beams and through the window to the inside of the building. For this purpose a few small panes of glass are removed. On the inside, the bolts pass through 6 in. by 6 in. timber baulks placed horizontally against the brickwork on both sides of the window opening ; to avoid damage, the bearing on the brickwork is taken by felt pads. When the first beam has been secured, the remainder are placed on top of it and every alternate beam is secured in the manner described. With this system, protection has not been confined to windows at ground floor level. For upper windows, which are 25 ft. to 30 ft. above the ground, a lighter section of beam 6 in. thick is used. For the purpose of hoisting the beams into position, a baulk of timber is secured to the roof of the building to overhang the parapet wall and to it is attached a pulley. Through this a wire rope passes from a lifting eye cast in the beam to a winch on the ground. Men at the winch raise the beam to the required position for bolting up. With the hoisting plant in position a window 8 ft. by 8 ft. can be covered in 20 minutes. It is worthy of note that the beams have been designed to resist positive and negative effects of blast, in accordance with the Engineering Precautions (Air Raid) Committee's Memorandum No. 1, Institution of Civil Engineers, and to comply with the requirements of the Home Office Code for thickness of reinforced concrete to provide protection against splinters from bombs up to 500 lb. falling at a distance of 50 ft. The bolts and fixing arrangements have been designed to resist the suction set up on this basis.

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We have received from the General Electric Co., Ltd., a copy of their latest publication devoted to their range of electric tubular heaters. This folder describes both standard types of tubular heaters and those designed for use in shop windows and similar situations. Details of air thermostats suitable for use in conjunction with this equipment are also included.

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We regret to have to report the death on active service of Sub-Lieut. J. S. G. Comfort in the sinking of H.M.S. *Sphinx*.

Mr. Comfort was associated with the development of the Trinidad companies, being a director of Previte (Trinidad Lake Asphalt) Continental, Ltd.

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Mr. W. A. Moore, joint advertising manager of W. T. Henley's Telegraph Works Co., Ltd., who is retiring after forty years' service, began his career with Henley's in 1900, at Woolwich works. In 1919 Mr. Moore became the first editor of the *Henley Telegraph*.

Mr. J. S. Simmons, who has held the joint advertising managership with Mr. Moore since 1934, now becomes advertising manager. Mr. Simmons entered Henley's service in 1920 and until he became joint advertising manager was responsible for the advertising of the company's distribution accessories and allied products.

THE BUILDINGS ILLUSTRATED

SHIPPING CHAMBER OF COMMERCE (pages 206–209). Architects: Sir John Burnet, Tait and Lorne. General contractors were Trollope and Colls, Ltd. Sub-contractors and suppliers included : Diespeker & Co., Ltd., terrazzo work ; Fredk. Braby & Co., Ltd., copper roofing ; John Bolding and Sons, Ltd., sanitary fittings ; Young, Austen and Young, Ltd., heating, hot water and ventilation ; Turpin's Parquet Flooring Co., Ltd., wood block floors ; Fenning & Co., Ltd., lunel marble ; Shaw's Glazed Brick Co., Ltd., glazed faience ; Aston Construction Co., Ltd., constructional steelwork ; James Gibbons, Ltd., ironmongery ; Crittall Manufacturing Co., Ltd., metal windows, lift enclosure and lantern lights ; J. A. King & Co., Ltd., pavement lights ; Haywards, Ltd., steel doors and Bostwick gates ; John Tann, Ltd., strongroom door and shelving ; Birmingham Guild, Ltd., bronze work ; Eric Munday, Ltd., lettering, notice boards, etc. ; Light Steelwork (1925), Ltd., balustrades ; Blunt and Wray, Ltd., roof railing and cat ladders ; Mr. Walter Gilbert, hanging sign ; Troughton and Young, Ltd., electrical work and lay-lights ; Merryweather

Frank R. Stagg, M.I.Struct.E., Assistant Managing Director of Thos. W. Ward, Ltd., and the Ketton Portland Cement Co., Ltd. Portrait was painted by Mr. Ernest Moore, for the directors of Thos. W. Ward, Ltd., and recently hung in the Board Room at Albion Works, Sheffield.

and Sons, Ltd., fire extinguishers; Waygood-Otis, Ltd., lifts; Wotton and Sons, glass and glazing; Christie (Decorators), Ltd., decorations; Trollope and Colls, Ltd., plumbing and drains, panelling, stonework; Mr. John Hutton, designing ornamental glass; Mundet Cork Products, Ltd., cork flooring; Vibro Insulations, Ltd., insulation; Gas Proofing Co., Ltd., gas proofing; Joseph Armitage, Ltd., stone carving; H. Meredith and Sons, A.R.P. blinds; E. J. and A. T. Bradford, wood carving; Joseph Brooke and Sons, silex stone; Brown and Tawse, Ltd., A.R.P. escape door; Bratt Colbran, Ltd., electric fire; Durasteel Roofs, Ltd., steel shutters; London Sand Blast Decorative Glass Works, Ltd., ornamental glass; North British Rubber Co., Ltd., rubber mats; Palmer's Travelling Cradle Co., Ltd., eye bolts, etc., for travelling cradles; Rydbeck and Norstrom, electrolier in main entrance; Osler and Faraday, Ltd., electroliers generally; Val de Travers Asphalte Paving Co., Ltd., asphalt; May Acoustics, Ltd., Maycoustic asbestonite; Sound Proofing, Ltd., acoustic celotex; Magneta Time Co., Ltd., electric clocks.

SCHOOL IN SOUTH SHIELDS (pages 209-211). Architects: T. A. Page, Son and Bradbury. General contractors were Henderson Bros. (1936). Principal sub-contractors and suppliers included: Steel & Co., Ltd., Sunderland, central heating and hot water supply; T. Sloan, electrical installation; J. W. Ellis & Co., structural steelwork; A. J. Wares, Ltd., sanitary fittings, collapsible gates, ranges and back boilers, tools and machinery; Steel & Co., Ltd., hardware; Parker, Winder and Achurch, Ltd., cloakroom fittings; Hills Patent Glazing Co., glazing; W. A. Swales & Co., Ltd., hardwood flooring; Denton & Co., rubber flooring; Mann, Egerton Co., Ltd., blackboards; James Gibbons, Ltd., cycle racks; J. D. Bennet, Ltd., Mann, Egerton & Co., Ltd., North of England School Furnishing Co., Ltd., Wake and Dean, Ltd., A. and F. Howland, Ltd., and Kingfisher, Ltd., furniture, chairs and stools, etc.; Spencer, Heath and George, Ltd., gymnasium equipment; Elsy and Gibbons, Ltd., gas cookers and boilers; J. D. Ainsley & Co., Ltd., and A. J. Wares, Ltd., sports ground equipment; Binns, Ltd., household furniture. Clerks of Works: John R. Pattison and N. H. May.

BANK NEWS

The Directors of the Midland Bank report that, full provision having been made for all bad and doubtful debts, the net profits for the year ended December 31, 1939, amounted to £2,181,350 15s. 5d., to which has to be added the balance of £628,315 0s. 5d. brought forward from last account, making together a total sum of £2,809,665 15 10

out of which the following appropriations have been made :—

To interim dividend, paid July 15, 1939, for the half-year ended June 30, 1939, at the rate of 8 per cent. actual less income tax at 5s. 6d. in the £	£879,200 0 4	
To reserve for future contingencies	500,000 0 0	
		1,379,200 0 4
Leaving a sum of		1,430,463 15 6
from which the directors recommend A dividend, payable February 1, 1940, for the half-year ended December 31, 1939, at the rate of 8 per cent. actual less income tax at 7s. in the £, making 16 per cent. for the year		788,248 5 10
Balance to be carried forward to next account		£642,217 9 8