THE PAGEANT OF PROGRESS

BUILDING TO-DAY

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General Editor: J. W. BISPHAM, O.B.E., M.A., B.Sc.

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1. PHOTOGRAPHY TO-DAY
2. FLIGHT TO-DAY
3. WIRELESS TO-DAY
4. ENGINES TO-DAY
5. WARSHIPS TO-DAY
6. CHEMISTRY TO-DAY
7. CIVIL ENGINEERING TO-DAY
8. ASTRONOMY TO-DAY
9. ELECTRICITY TO-DAY
10. THE CINEMA TO-DAY
11. RAILWAYS TO-DAY
12. MOTOR-CARS TO-DAY
13. IRON AND STEEL TO-DAY
14. MILITARY SCIENCE TO-DAY
15. THE POLICE AND CRIME DETECTION TO-DAY
16. THE MERCHANT SERVICE TO-DAY
17. PRINTING TO-DAY
18. THE FIRE SERVICE TO-DAY
19. BUILDING TO-DAY

PLATE I

55 Broadway, Westminster, Headquarters of London Transport. (*By* Adams, Holden and Pearson, FF.R.I.B.A.)

BUILDING TO-DAY

by

MARTIN S. BRIGGS, F.R.I.B.A.

GEOFFREY CUMBERLEGE
OXFORD UNIVERSITY PRESS

By the Same Author

IN THE HEEL OF ITALY (*also in Italian*)
BAROQUE ARCHITECTURE (*also in German*)
THROUGH EGYPT IN WAR-TIME
MUHAMMADAN ARCHITECTURE IN EGYPT AND PALESTINE
A SHORT HISTORY OF THE BUILDING CRAFTS
RUSTICUS: OR THE FUTURE OF THE COUNTRYSIDE
THE ARCHITECT IN HISTORY
ENGLISH ARCHITECTURE: AN OUTLINE
THE HOMES OF THE PILGRIM FATHERS IN ENGLAND AND AMERICA
MIDDLESEX: OLD AND NEW
FREIBURG AND THE BLACK FOREST
HOW TO PLAN YOUR HOUSE
ROUND THE SHIRES
PURITAN ARCHITECTURE
MEN OF TASTE
ARCHITECTURE (*Home University Library*)

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FOREWORD

IN writing this little book, I have intentionally omitted any description of the methods and expedients temporarily adopted during the war which so largely put an end to normal construction. Shortage of labour, shortage of materials, and the paramount need for economy have led to a sacrifice of all standards hitherto prevailing, and to the limitation of all building to the minimum. So, except for incidental references to the effect of 'blast' and to current ideas about 'pre-fabrication,' I have dealt with building as it was practised in 1939, and as we hope it will be resumed as soon as circumstances permit.

My thanks are due to all the architects who have allowed me to reproduce illustrations of their work, to the London Passenger Transport Board for the use of Plates 1 and 20*a*, to the Royal Institute of British Architects for 14*b*, to Welwyn Garden City, Limited, for 23*b*, to the Town Clerk of Norwich for 16*b*, to the Hampstead Garden Suburb Trust for 23*a*, to the Middlesex Education Committee for 11*a* and 11*b*, and to the following journals and firms for the use of their copyright photographs: *The Architect* for 6*b* and 18*b*, *The Architects' Journal* for 7*a*, 19*a*, and 19*b*, *The Builder* for 22*b*, *Building* for 12*a*, *Aero Pictorial* for 11*b*, Southern Newspapers Ltd. for 15*b*, and Mr. S. W. Newbery for 8*a*, 8*b*, and 17*a*. The line drawings in the text are my own work.

M. S. B.

MILL HILL VILLAGE.

CONTENTS

LIST OF PLATES

CHAPTER I

THE MEN WHO BUILD

THE scope of this book should be apparent from its title, but because there is a subtle distinction between 'building' and 'architecture,' and also because some branches of building approximate to civil engineering, perhaps it may be well to define our subject rather more precisely. An earlier volume in this series has dealt with civil engineering, including bridges, roads, canals, railways, great irrigation schemes, reservoirs, dams, and so on. All these types of construction are excluded from the present book. As for 'architecture,' that word should include all properly designed buildings for the habitation and use of man. It does not imply merely the outward aspect or the ornamental features of a building; indeed, a good work of architecture may be severely plain and very small. Even an air-raid shelter, the most utilitarian and rudimentary product of our modern 'civilization,' may be made a trifle less forbidding by a skilful architect, without the addition of ornament, yet this is probably the most unpromising subject with which he has ever had to contend. To take another case, the pit-head buildings of many modern collieries are quite pleasant to behold, because they have been well designed, and certainly no ornament is allowed there. Factories, too, may be made much more attractive than the 'dark Satanic mills' of a century ago, merely by the application of a trained mind to their severe forms. Architecture has recently been defined as 'the art of delightful building,' but that suggests something more frisky and romantic than is always possible; and if we substitute 'the art of good building,' that may mean no more than the use of sound materials skilfully put together. My own preference is to regard architecture as 'the art of ordered building,' and there I must leave it, merely adding that this book is confined to such buildings as may be considered works of architecture.

Because I am writing primarily for those who have not yet embarked upon their careers or decided what those careers shall be, it seems appropriate to begin this study of 'Building To-day' with some account of the men who plan, erect and equip buildings. The precise functions of these men vary greatly according to the 'job': thus on very small and utilitarian buildings no architect may be employed, or there may be an architect but no consulting engineer.

The actual work may be carried out by a rustic jack-of-all-trades or by a highly organized firm of contractors. On very large buildings there is a whole host of sub-contractors and 'specialists' of various kinds, besides the architect, the engineers, and the general contractor. The work of any responsible member of this complicated hierarchy is interesting, but the most interesting part of it falls to the architect.

It is, unfortunately, a fact that a high proportion of small villas, shops and minor buildings are erected annually in this country without any architectural advice. The idea seems to be prevalent that such advice is a superfluous luxury for a very plain or very small building. Other popular misconceptions are that the architect's main task is to draw pretty but rather fanciful pictures of his imaginary designs; and that for utilitarian buildings he is only brought in, somewhat late in the day, to 'art up' the structural skeleton designed by the mathematically-minded engineer. These various misconceptions, for which certain foolish and short-sighted architects in the past must bear a fair share of blame, have not only done much harm to the profession, but—much more important—have contributed heavily to the mass of ill-designed building that defaces so many of our towns and so long a stretch of sea-coast. It is the job of the architect, and nobody else, to design buildings, however small and unimportant and utilitarian they may be. If you consult your lexicon, or even the *Concise Oxford Dictionary*, you will find that the word 'architect' (in Greek ἀρχιτέκτων) means simply 'master-craftsman.' All through recorded history, from the time of the Greeks onwards at least, some person has planned each notable building and generally has also supervised its erection. It is the exercise of this dual function, to my mind, that constitutes the architect. In the Middle Ages he usually appears in the chronicles of cathedrals and abbeys as 'Master' (*magister*); but, whatever he was called, he must have been there. The idea that our great medieval buildings simply sprouted up without plans of any sort is absurd, and, as many such plans have survived, some person must have drawn them.*

The architect's chief task as designer is *planning*, yet planning is just that part of his work which is ignored when people talk about structure on the one hand and ornament on the other. Planning means the arrangement of a building on a given site to fulfil a given purpose, and is explained in Chapter III of this book. The architect obtains his instructions—often precise but not always very practical

* On all these questions see my book, *The Architect in History* (Oxford, 1927).

or very consistent—from his employer, the building owner, commonly called his 'client.' He then has to produce certain specified accommodation at a reasonable cost in the form of a building which is structurally sound, and at the same time aesthetically satisfying within and without. In order to put his ideas on paper, to convey them to his client for approval, and then to get them carried out by a builder under the precise conditions of a legal contract, he must be able to draw: no mere verbal description will suffice.

An architect, therefore, relies on drawing as a means of transmitting his ideas to others; if he cannot draw, he is as much handicapped as a parson who stutters or a barrister with no roof to his mouth. But drawing is by no means the only skill that he needs. A parson or barrister who is merely fluent and has no ideas worth uttering is a failure; so is an architect who can draw and do nothing else. Such a man ultimately becomes a hack draughtsman: only a few lucky ones earn a living by drawing 'perspectives' for *other* architects to exhibit at the annual shows of the Royal Academy. A successful architect must be an all-round man with a versatile brain like a barrister's, a man of the world who can quickly grasp his client's wishes, a 'good mixer' who can deal pleasantly with men of other classes and professions, a practical man with some taste for mathematics and science who knows how things work and why they go wrong, a man with business acumen. Such a repertoire suggests the Admirable Crichton, and few architects are so generously gifted, but the best of them certainly are, and it is foolish to encourage every boy and girl who shows some talent for drawing at school to think that they are potential Christopher Wrens. In fact, Wren was a great mathematician and scientist before ever he turned to architecture; and a good general education, up to school certificate standard at least, is the best foundation for an architectural career. A taste for drawing is a desirable and even essential item in the architect's make-up, but he can learn most of his drawing *after* he has begun his professional studies. Nowadays, the best way to pursue those is in a school of architecture, of which eighteen are 'recognized' by the Royal Institute of British Architects in England and Wales alone, and after five years' full-time study the student should find himself or herself in possession of the diploma which gives entry to the profession.* It may be added that the architect's work, at its best, is

* See *The Training of the Architect*, by M. S. Briggs ('Educational Pamphlet No. 118'), published by H.M.S.O., 1943.

an engrossing and delightful vocation; but only a limited number of those who become architects can hope to gather the plums of the profession.

Up to a certain limited point, a competent architect should be able to design all parts of a building himself, including its steelwork and its heating system; but in the case of large or specially complicated buildings he has recourse to the advice of consulting engineers who undertake such calculations as are beyond his grasp. In recent years this tendency has increased as the complexity of buildings has increased: a century ago the practice was almost unknown. The civil or structural engineer is called upon to design the frame of a steel or ferro-concrete building; nevertheless, the architect who consults him should have sufficient knowledge of those forms of construction to be sure that his design will not have to be altered materially to comply with the demands of the consultants and to see that his client gets full value for money from the specialist advisers. A structural engineer carries the study of mathematics and mechanics farther than the average architect does, but is not trained in the aesthetic side of design or in the economic principles of planning; in other respects, his curriculum has many points of similarity with the architect's, and his profession should appeal to any boy with a combination of mathematical and practical ability. Then there is the electrical engineer, whose functions need no description here. The heating engineer is another 'specialist' who figures largely in modern building: his studies, too, differ from those of the architect by omitting certain items and specializing instead on his own particular branch.

So far I have dealt with the architect solely as an independent practitioner; but, in fact, only a proportion of those who enter the profession do achieve independence, and that proportion is declining steadily with the growth of architectural departments under the State and public authorities. Every county council has an architectural staff of its own engaged in designing schools, housing schemes, hospitals and other public buildings; and the same applies to most municipalities. For posts in the public service the same technical qualifications are required as for private practice. The work is less exciting and, on the whole, less exacting. It is often monotonous, as a draughtsman is usually confined to one branch of building (*e.g.* hospital equipment or schools) unless and until he reaches a senior position. On the other hand, he escapes a good deal of worry and leads a relatively placid and pleasant life. In every large public

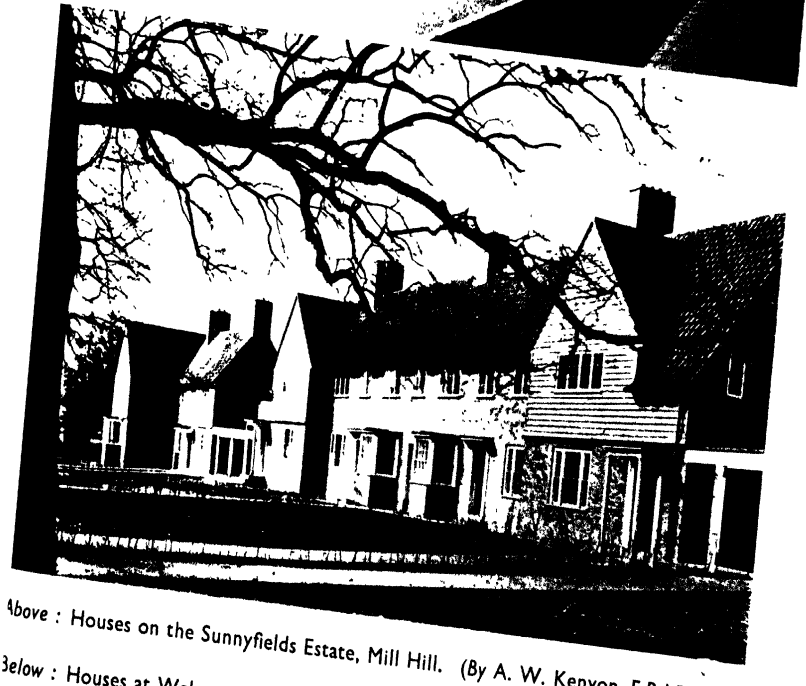
department of building, structural engineers and heating engineers are employed, and they collaborate with the architects.

Next comes the quantity surveyor, who also may be either a private practitioner or a public servant. An architect employs a quantity surveyor on all buildings of any size, unless he does such work himself, as happens in many of the smaller provincial towns. When the architect has completed his design the quantity surveyor enters the field. His duty is to take measurements, from the plans, of all the materials and labour required to construct the building, down to the last tin-tack and the final coat of paint; indeed, he actually provides for the scrubbing of floors and the cleaning of window panes on completion! The preparation of a 'Bill of Quantities' is a most formidable task, so it is preferable that a specialist should do it rather than let it be added to the architect's already overwhelming responsibilities. (Indeed, this is a case where two heads are better than one.) A quantity surveyor must know at least as much about construction as the architect does, and more about finance. He must be a quick, accurate and methodical worker, with a taste for figures and a good business head. A copy of the 'Bill of Quantities'—an imposing document of several hundred pages for a building of any magnitude—is handed to each of the builders who are to furnish estimates or 'tenders' for the work, and from those competing firms one is selected—usually the one who has submitted the lowest tender—to carry it out. But the task of the quantity surveyor does not end there. All through the progress of the building he is at the architect's right hand to advise him on the amount to be paid by instalments to the builder, and when the enterprise is completed he has to compile an elaborate statement of 'variations' on the contract during building, so that the final payment may be made.

There are surveyors of other kinds who appear upon the scene before operations can begin. The 'building surveyor' is employed by the municipality or local council to ensure that every structure erected within his area shall be so designed and built that it will neither collapse, nor interfere with the community's enjoyment of light and air, nor contain any feature injurious to the health of its inhabitants or their neighbours. He is concerned, as you will note, simply with matters of hygiene; and his Bible is the book of local by-laws, from which he has no authority to diverge. Like the quantity surveyor, he has to know a great deal about construction; he also has to know the by-laws by heart and be well acquainted with local conditions of subsoil, drainage, and water-supply. His work

is somewhat prosaic, but appeals to people of an unadventurous type, and the higher posts are well paid. Many architects resent his power, especially if he is a surveyor or engineer by profession and has control of the town hall architectural staff who design municipal buildings. It is often urged that there should be municipal control of the design of exteriors, too, in order to prevent incongruous or ugly buildings, but if this be assigned to a man who is not a trained architect, you can well imagine that architects themselves would be the first to kick against any interference with *their* designs. In some districts a 'panel' of architects has been appointed to carry out this very delicate task. Control of this kind is already exercised, however, by the 'estate surveyors' (usually architects), employed by the great London landlords, and they prescribe the materials with which each building must be faced as well as many other features of its appearance. So you will realize that everywhere in England, but especially in London, the designing of a building, however insignificant—such as a shed or garage—is subject to control, and the architect is by no means a free agent.

Now at last we come to the builder, more precisely the master builder. There are two main types of builder: the general contractor and the speculative builder. The former obtains most of his work by submitting 'tenders' on the basis of the 'Bill of Quantities,' as already described. If a public building is in question, our democratic habits insist that all builders shall be notified of the opportunity to tender by means of an advertisement in the public press. If it is a matter of erecting a private house or a church, tenders are usually invited by the architect from a hand-picked list of firms whom he knows he can trust not to let down his client or himself by bad workmanship. During the progress of erection, which may take anything from a few months to several years, according to the nature of the work, the architect and the builder are constantly in touch, and the builder is paid by instalments as the 'job' proceeds. Although the architect, by means of his plans and specifications, tells the builder exactly what to do, he does not tell him how to obtain the necessary labour and materials. Thus the builder's work, though it involves a high degree of technical knowledge, consists mainly of organization; and above all he needs a good sense of business acumen. The building industry is said to provide more bankruptcies than any other (thanks partly to the system of competitive tendering), and conversely it affords scope for amassing great wealth; so it is a promising field for a man who likes taking risks. During the last few



Above : Houses on the Sunnyfields Estate, Mill Hill. (*By* A. W. Kenyon, F.R.I.B.A.)
Photo : Robinson & Co.

Below : Houses at Welwyn Garden City. (*By* C. H. James, A.R.A., F.R.I.B.A.)
Photo : S. W. Newbery

PLATE 3

Above : House at Saltdean, Sussex. (*By* Connell, Ward and Lucas, AA.R.I.B.A.)
Photo : S. W. Newbery

Below : Houses at Edgware. (*By* H. A. Welch and F. J. Lander, FF.R.I.B.A.)

years its character has greatly changed. About fifty years ago the 'general contractor' furnished almost all the labour and materials for any sort of building, but now a large part of the work is done by so-called 'specialists' and sub-contractors (*e.g.* for steelwork, ferro-concrete, lifts, ready-made doors and windows, electric lighting, even plaster work); yet, though half the total work may be sublet, the general contractor has to take the responsibility for getting all these other craftsmen and materials on and off the building in time. This, naturally, makes it all the more important that he should be a first-class organizer. Insufficient attention has been paid in the past to the training of the master builder, who often graduates from the ranks of the craftsmen on the strength of business acumen, probably with an intermediate period as a 'speculative' builder.

The speculative builder has provided a large proportion of England's homes, and is also blamed, often with justification, for most of her eyesores. If he thinks fit, he can employ an architect to design all his buildings: and indeed some of the best speculative builders (such as William Willett of 'daylight saving' fame) have done so. But, even in that case, he is the boss, and the architect has to produce what the builder wants, or else resign his post. The speculative builder is a man who buys land and builds houses, flats, offices, or factories upon it as a speculation, using his own instinct and experience to tell him what the public wants and therefore what he can sell or let at a profit, often very large. To sell his houses in the first instance, a certain standard of appearance (not excluding 'eyewash') must be preserved; to continue selling houses, their workmanship must be sufficiently sound to last for a few years at least. He must also satisfy the municipal by-laws, but this seems to be achieved somehow with surprising ease. The question of housing is dealt with in Chapter IX of this book, so no more need be said here about the speculative builder except to remark that he may be either a public benefactor by providing homes that the people need or a public enemy by foisting trash upon them. The term 'jerry builder,' which does not seem to be more than eighty years old, is of uncertain origin, though every one knows what it means. There is no reason why it should be applied to any honest purveyor of dwelling-houses.

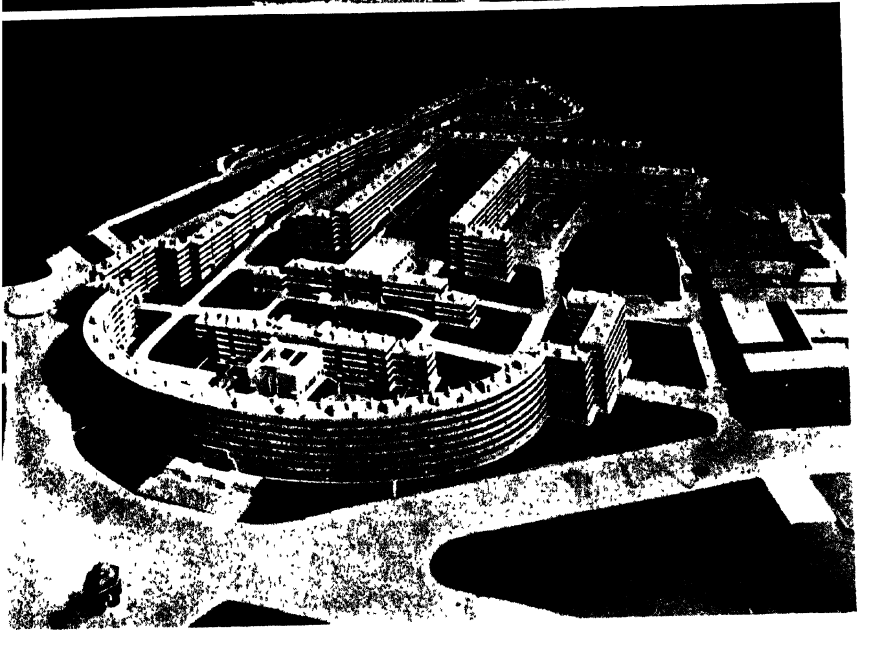
The functions of the various building craftsmen—bricklayers, masons, carpenters, joiners, plumbers, tilers, slaters, plasterers and painters—need no explanation here; and the work of their immediate superiors—the foremen, general foremen, and clerks of works—is also commonly understood.

CHAPTER II

FINDING A SITE

IF the various stages of 'Building To-day' were to be approached in strictly logical sequence, it might be argued that planning should precede the choice of a site. In practice, however, this is not always so. In the case of an ordinary dwelling-house, a man often purchases a site before he approaches an architect. This is unwise, as a trained eye may find defects in a site that do not occur to an amateur. Where large buildings are projected, particularly in towns, it would be sheer folly to purchase an expensive site without obtaining a professional opinion in advance. Any site—large or small, spacious or cramped, cheap or costly—should be investigated from several points of view, viz. shape, aspect, contours, subsoil, accessibility, locality, available amenities and services, liability to 'easements,' and, of course, price.

Most of these conditions apply to any site for any type of building, but let us take a simple case, where Mr. Smith has already bought a site of an acre or half an acre in an attractive country district near a large town and proposes to erect upon it a detached house for his own use. To make the case simpler still, we will assume that he has not been swindled by the vendor of the land; and that he has just asked Mr. Michael Redbrick, F.R.I.B.A., a friend of his solicitor's, to design a house to suit the site. The architect arrives on the scene full of misgivings, but is relieved to discover that the site is large enough to accommodate a house of the desired size, with a garage, and that the approach to the house can be contrived without felling some attractive pine trees that stand near the road and give character to the place. The road mentioned lies conveniently on the north of the site, which slopes briskly down to the south, so that the house can be placed near the entrance with its chief sitting-rooms facing southwards and commanding an extensive view of unspoiled country. So far so good, but Smith's desire for a hard-court complicates the problem, and Redbrick has to warn him that it will be a costly business, as the house must occupy the flattest part of the site, so that expensive excavation will be entailed. The 'aspect' of the site, full south, also seemed ideal until Redbrick tells Smith that a substantial part of the foreground of his view has been 'zoned for industrial development' under a town-planning scheme of which Smith has never heard, and that a firm manufacturing glue by a very unpleasant



Above : Dorset House, London. (By T. P. Bennett, F.R.I.B.A., and Son.)
Below : Model of Flats at Quarry Hill, Leeds. (By R. H. Livett, A.R.I.B.A., Housing Director.)

Photo : S. W. Newbery

PLATE 5

lats in Charterhouse
quare, London.
By Guy Morgan,
.R.I.B.A., and Partners.)

Cholmeley Lodge,
Highgate.
(By Guy Morgan,
F.R.I.B.A., and Partners.)

process is about to build its works three fields away: the prevailing wind is south-west. As Smith never took the trouble to see the town plan when it was exhibited to the public at the county hall, twenty miles away and ten years ago, he was quite unaware of this risk when he bought the site, and now he has no redress.

In the matter of subsoil he is more fortunate. Much of the surrounding area is floored with London clay, a 'colloidal' substance containing a varying amount of moisture, so that in wet weather it absorbs more moisture and expands, shrinking and cracking in the summer heat, and thereby cracking the foundations and walls of almost every building resting upon it, even a small and relatively light house. But the site chosen is on gravel, from which the water drains away rapidly to the clay five feet below, so that failure of foundations need not be feared. Smith has, naturally, borne in mind the accessibility of the site, has ascertained that there is a school for his children reasonably near with a convenient bus service, that the tradesmen from the town call with sufficient frequency, and that there is electric light from the 'grid,' gas, and water, in the road outside. All that is common sense; he has, however, overlooked the fact that he obtained the site at a bargain price (i) because the sewer in the road is too shallow to take the drains from any house on his site, and he will therefore have to install a cesspool; (ii) because the proprietors of Narkover College, Ltd., have just acquired the land on either side of him, and also the site opposite his plot, for the erection of large new reformatory-school buildings, for which plans have already been passed by the local council. Here, again, he has no redress, and though his rural site is free from all 'easements' such as rights of way or 'Ancient Lights,' his tribulations are increased when he finds that a scheme has been approved for the widening of the road as a trunk highway and that this will take place largely on his side of the existing narrow lane. His pine trees will be felled, and the new wall or fence that the county council offer him by way of compensation will be small amends for the exposure of his house to full view from Narkover College.

This fancy picture of an imaginary building owner's troubles as a result of acquiring a site too precipitately is not grossly exaggerated: any or all of these things might happen, and in fact frequently do happen. Some of the precautions to be taken are based upon science plus experience, others upon knowledge of local administration plus foresight. The study of subsoils should be scientific, yet even to-day is still in its infancy. You can buy geological maps of every district

of England, but that does not get you very far. A geological map shows the main rock formations where they appear on the earth's 'surface,' but takes no account of the thin layers of loam, gravel, or 'drift' that overlie them. Thus your house may stand, as mine does, upon a few feet of precious gravel, but the map shows the London clay lying beneath the gravel. The finest subsoil for building purposes is, of course, solid hard rock such as the ground underlying New York City (hence its skyscrapers) and Liverpool Cathedral. The worst subsoil of all is mud, such as Venice was built on fifteen hundred years ago, and Singapore and Shanghai in recent times. The London County Hall was erected in 1908–22 upon the foreshore mud of the Thames, mud so deep that when it was drained a Roman galley was discovered (now in the London Museum). In that case a huge retaining wall was constructed along the new river front and a huge concrete waterproof tank, like a dry dock, was formed inside it to contain the great new building. Between these two extremes—rock and mud—we have chalk, various kinds of gravel, sand, and various kinds of clay. Chalk forms an excellent foundation for building; indeed it is a soft and porous sort of rock, very dry except when exposed to the weather. Gravel is generally satisfactory, and much of London is built thereon. Sand presents many problems, for, though it is the driest of all subsoils, it is quite unreliable as a foundation if it can possibly slide laterally. Clay varies enormously in quality; and, ever since I was a student, I have marvelled at the airy statements in text-books that 'hard blue clay' would carry 'x' tons to the square foot and 'solid clay' would carry 'y' tons. Who, I asked myself, would decide when this unpleasant muddy stuff could be called 'blue'? Now the scientists at the Building Research Station, together with their brethren elsewhere, are getting busy on this abstruse problem of 'Soil Mechanics' as they call it. They are inclined, as a result of their investigations, to scoff at the empirical figures of strength quoted in the text-books, and to recommend that the subsoil of every building, not merely large buildings, should be tested separately at numerous points on the site and at varying depths. Thus one could make a map and a section of the site on *any* plane, showing the nature and the compressive and 'shearing' strength of the subsoil at any point. The method of obtaining samples for testing is most ingenious: a brass tube of four-inch diameter, with a sharp lower edge, is augered down into the earth, and samples about fifteen inches long are taken out for testing in various ways in a laboratory. The bore-holes are carried far below

the intended bottom of the foundations because it has been discovered that the weight of the building produces sliding movements to a considerable distance laterally as well as vertically. It has always been usual to sink trial holes under the site of any heavy and important building: the new method is far more searching and satisfactory, but it illustrates the increasing tendency to make building more scientific and, therefore, more complicated. Personally, I always find my periodical visits to the Building Research Station depressing as well as interesting: partly because each visit seems to increase my feelings of ignorance, partly because each reveals more pitfalls into which the architect and builder are liable to fall. Just as hospitals, though beneficent institutions, rely for their healing discoveries upon casualties, so research institutions depend largely upon failures to further the advance of knowledge. Every young architect who feels cock-a-hoop can cure himself of that disorder, either by visiting the 'B.R.S.', or by attending any case in the law-courts when some experienced colleague is being hauled over the coals by a clever K.C. in a case of alleged architectural 'negligence.'

Returning to building sites, most of the unpleasant possibilities suggested in the first part of this chapter may be averted if careful enquiry is made at the local town hall about the operation of the town-planning acts in force. This legislation is intended for the benefit of the community and is further explained in Chapter XX of this book. If an area is earmarked or 'zoned' for industrial buildings, any prospective house builder in the neighbourhood should inform himself of that fact and take precautions accordingly. If a road is to be widened in the interests of the community, some property owners must obviously give up strips of their frontage for the purpose, and they should face and foresee that possibility. The only way of preserving a view from your windows permanently is to buy the whole of the land which it embraces, or else to build on a site overlooking land which is scheduled as a public open space: this information, too, can be obtained from your town hall.

Building sites in crowded towns present even more serious problems. Every square inch of ground is valuable, and a street-widening scheme which lops five feet off one frontage also reduces enormously the potential rental value to be obtained from any tall building that may be erected on the site. The height of the building is regulated by the width of adjoining streets and the adjoining buildings. The adjoining owners have rights of light which they will certainly

exercise, and the municipal surveyor will have all sorts of things to say about means of escape in case of fire. It is hardly likely, however, that anyone would be so rash as to buy an important urban site without invoking expert assistance.

CHAPTER III

PLANNING

You have now been introduced to the architect and the site. How does he set about planning the building that is to be erected upon it? I have used the word 'planning' rather than 'designing' here, because the latter word has been so much misunderstood and abused. The architect does not, or should not, start with any preconceived idea of a façade, and he does not begin with structure. He has been commissioned to provide certain specified accommodation upon a specified site, often for a specified sum of money. (Sometimes the last-named condition is unreasonable: it would be more fitting to ask him what accommodation he can provide for the figure named, or, alternatively, what the specified accommodation will cost.) Put in its simplest terms, he has to provide certain spaces for human habitation, work, amusement, instruction, or worship; to enclose them within walls and roof from cold and damp; to provide them with the necessary light, air and warmth; and to make walls and floors structurally strong enough to carry the weight of the occupants and their equipment. That is the task set for him, but as an architect he must accomplish it with due regard to the aesthetic impression created by the building internally as well as externally, and to the amenities of the street or countryside in which it is to take its place.

The rooms required, in the case of a dwelling-house, will be prescribed for him only too definitely by the building owner. If the building is to be a church, a school, a factory, a bank, or a block of shops, the requirements will be almost as clearly defined, and are discussed in later chapters of this book. Some architects begin planning in their heads, tramping over the moors or sitting in an armchair amid clouds of tobacco smoke; others play games with bits of coloured paper to represent the various rooms to scale, shuffling them about on a drawing-board; others cover yards of tracing-paper with trial plans until they evolve something that satisfies them.

But this planning process does not involve neglect of elevations or structure: the three operations are considered simultaneously in the designer's mind. Fifty years ago there was more straining after symmetrical elevations than there is nowadays: the architect who had determined to provide a neo-Georgian façade for a house, unless he could place the bathroom and the w.c. in some inconspicuous angle away from the front, had to make their windows match those of the drawing-room and the best bedroom. It is true that great pedimented colonnades and other Renaissance features did cramp the style of all designers a generation ago, hence the subsequent agitation for 'functional' design, which means that function takes precedence of appearance and symmetry every time. As will be explained in the next chapter, that trend has led to a lack of dignity in many modern buildings, and the pendulum seems to be swinging rather slowly back towards a happy mean. At all events, we have learned during this century to regard planning more definitely from a functional standpoint and less from the point of mere effect.

However precise may be the instructions received from his 'client,' the architect has to amplify them and modify them as his plan proceeds. He will have recourse to books and to illustrations in the technical press, to the advice of his professional colleagues and friends, and to his own experience. He will make a special study of the type of building on which he is engaged, and will consult people who use such buildings, among them even the commissionaire at the door and the man who stokes the boilers if the building is a large one. He will not disdain inspiration from abroad; but, if he is a level-headed man and not specially ashamed of his own country, he will also try to remember that he is an Englishman.

So much for his methods in general: now for practical procedure. In every building, even a suburban villa, there is the important factor of 'circulation': that is, of traffic from point to point. Heart-breaking figures have been published by women's societies showing the number of miles trudged annually and unnecessarily by the over-worked housewife in a badly-planned kitchen. In a factory economy of circulation is obviously of prime concern, especially where mass production methods are practised. Even in a church or cinema, easy access and rapid exit have to be considered and are strictly prescribed by regulations. 'Circulation' involves the scrutiny on plans of all possible journeys from point to point: in hotels, municipal buildings and schools it is one of the chief matters a designer has to consider. Allied to this problem is the question of

entrances: how many and where? In many types of building, access for coal-carts and goods lorries presents difficulties. The more entrances you have the more difficult and expensive it is to supervise them by means of a janitor; the fewer you have the more congested will they become. Rooms where quiet is essential for purposes of work and study should not be placed on corridors where there is likely to be much internal traffic, or facing on to busy streets where the noise of external traffic may be equally disturbing. This all sounds very obvious, but the question of noise has become so important in building to-day that it is treated in some detail in Chapter VIII of this book. It is a simple fact that there are costly modern buildings containing rooms that are quite useless for their intended purpose because of external noises; and the recollection occurs to me of a famous institutional library, a model of its kind, used largely by serious students, which was originally proposed to be part of a processional suite of ceremonial rooms for occasional use at receptions. It fell to my lot to urge, against considerable opposition, the view that a library should be, above all, a quiet place, a literary workshop; and ultimately that common sense and un-original view prevailed.

In all important public buildings, although batteries of lifts may be, and probably will be, installed, it is usual to make the main staircase very wide, easy and imposing. Some architects used to be encouraged to study the monumental staircases of the fine Renaissance palaces lining the Via Garibaldi in Genoa. These were built in the sixteenth and seventeenth centuries for rich merchants, have since passed into public or municipal or commercial ownership for the most part, and have suffered very severely from our aircraft in recent years. It was the fashion in Italy of the Renaissance to place all the most important rooms on the first floor, the *piano nobile*, hence the glorification of the staircase. About one hundred years ago Sir Charles Barry provided several of the London clubs in Pall Mall with fine examples, based on Italian models; but even before his day the Athenaeum Club was noted for its gloriously extravagant staircase, occupying all the centre of the building. Another magnificent specimen of Victorian date may be seen at Stafford House, now the London Museum, formerly the home of the Duke of Sutherland. It was of this building that Queen Victoria is reputed to have remarked to its owners that she always felt, on visiting them, that she had come from her house to their palace, and it must have been the staircase that inspired the remark. Among modern build-

ings where the idea of the grand staircase to the *piano nobile* is preserved may be mentioned the Senate House of London University (see p. 80 and Fig. 9) and the Royal Institute of British Architects in Portland Place.

But in the small dwelling-house of only two storeys the staircase is of even greater importance, and the whole success of the plan depends upon its proper arrangement. Usually it is the architect's nightmare, a fact which utterly disproves the widespread myth of 'the architect who forgot the staircase.' The most incompetent and slipshod architect that England has ever produced could hardly do that, however badly he may have muddled the planning of the staircase, which is, in fact, a very difficult operation. My own experience has been that when 'clients' have brought me, to my intense embarrassment, home-made sketch plans of the house they want me to plan for them, the staircase has been omitted and left for me to contrive: usually a quite impossible task with the rooms as drawn by them. More will be said of staircases in subsequent chapters.

Another perplexing item is the disposition of water-closets, lavatories and bathrooms. In large hospitals these are, like the wedding presents reported by budding journalists, 'both numerous and costly,' and are grouped in so-called 'sanitary towers' disconnected from the wards by ventilated lobbies. In non-domestic buildings of any sort they are similarly concentrated, usually out of sight in the rear of the building. This practice is due to a variety of causes. Firstly, the number of small windows and the number of exposed pipes that are involved cramp the architect's style in designing a harmonious and dignified exterior; secondly, there is a possibly prudish prejudice among many people against the 'indecent exposure' of these inescapable adjuncts of our life; and thirdly, the concentration of plumbing and drainage leads, on the whole, to greater economy and efficiency. In private houses, too, the same reasons apply with no less force. The 'sanitary tower' is impossible, but the average householder has no desire to parade his water-closet window and pipes before the gaze of all the other denizens of Acacia Avenue; though, if he employs a very 'functionalist' architect, he may be begged to do so. Generally speaking, the concentration of as many domestic sanitary fittings as possible at the back of the house leads to efficiency, but it also raises a vexed problem, partly connected with the question of 'aspect.' Architects are frequently abused by housewives for 'putting all the pipes on the cold side of

the house'; but they are driven to that expedient for the very simple reason that, in England, the housewife herself asks that all the sitting-rooms, the best bedrooms, and perhaps even the kitchen shall face the sun. Almost inevitably, all the sanitary fittings, all the pipes and the cisterns have, therefore, to be relegated to the north; but remember that there is nothing to prevent the housewife and her husband from having all the pipes cased and wrapped, if only they are prepared to pay the extra cost.

The larder should always face north in any house, for the sake of coolness; but in a suburban street running east and west, where one group of houses faces north and the other south, it is evident that the observance of this desirable rule becomes impracticable unless the 'client' can be persuaded to place the kitchen, larder, bathroom and water-closet on the street frontage in each house facing north! Yet, if he does so, his architect will be condemned for putting pipes on the cold side of the house, so the poor man will be in trouble again! It used to be held that all studios and drawing-offices should face north, but that view is not so often voiced nowadays: it is more important, in my opinion, that a class-room or any other room used mainly for writing or drawing in the daytime should have left-hand light of some sort, not necessarily from the north. This suits everybody except left-handed people.

All these considerations are utilitarian to some extent, but there are many others to be borne in mind that are certainly not utilitarian. The instance of the monumental staircase has already been cited as an example of planning where something much more than mere convenience is involved; the need for producing an effect of grandeur and dignity. In every important building, similar qualities are required in all the public rooms and in their mutual relation. There are certain ideal proportions to be aimed at in planning such apartments, and the 'double cube room' at Wilton House, designed by Inigo Jones in 1649, is still regarded as a model. But if its admirable proportions were to be adopted throughout all the chief rooms of, say, an embassy, the resultant effect would be very monotonous, so the architect endeavours to produce variety by alternating double cubes with circular halls, octagonal rooms, long galleries, square rooms, and so forth, according to the possibilities offered by his subject. The rooms of the Royal Academy of Arts in London, or of the National Gallery, whether they are regarded as first-class architecture or not, illustrate my point; as you will see if you refer to the little plans printed in their respective catalogues of pictures.

This habit of studied formal planning reached its height in the eighteenth century, and may be seen in such huge mansions as Castle Howard and Blenheim, both designed by the architect Vanbrugh, who also wrote plays and had a keen dramatic sense in architecture. But, in those vast palaces, magnificence was carried to excess, the welfare of 'menials' was ignored, meals came cold from remote kitchens at the end of great curved colonnades, and even the princely owners suffered discomfort so that the architect's dream of a vista from end to end of a whole suite of rooms (through the key-holes) could be achieved, while the guests at Castle Howard shivered in the draught that rose from the marble floors to the lofty dome. Nevertheless, architectural students to-day compete strenuously for the 'Rome Scholarship' which, up to the war, enabled them to study monumental planning of nearly two thousand years ago in the great *thermae* and *fora* of the Imperial City.

In the design of such buildings as churches, theatres, cinemas and concert-halls, the shape of the principal space or hall is obviously of prime importance from the point of view of scenic effect, but here the new science of acoustics partly controls the architect, as will be explained in later chapters. Even in a dwelling-house it is possible to produce pleasant or unpleasant shapes of rooms, as well as convenient or inconvenient shapes; and to achieve a striking effect by clever planning of a relatively small entrance hall, staircase and landing. Factories and business premises certainly offer little scope for monumental planning, but the board-room and the entrance to the administrative block may present an opportunity for an architect to display something more than mere utilitarian efficiency. There is no reason why the interior of a power station, or the casual ward of a 'poor law institution,' should not be perfectly satisfying to the eye. Finally, any architect worth his salt is conscious throughout his planning of the group of masses, great and small, that is emerging; and is consciously or subconsciously manipulating them to form a satisfactory exterior.

He is also conscious, perhaps painfully conscious, of any conditions of cost that may have been imposed upon him. These conditions, as already remarked, may stipulate both accommodation and cost, and may be incompatible. The building that emerges on paper from his first cogitations may prove too large for the stipulated cost and may, therefore, have to be trimmed. The calculations by which he makes his preliminary estimate are very simple: they consist in ascertaining the cubical contents of the building by ordinary

mensuration, and then by multiplying the resultant total of cubic feet by a figure (say 1*s.* or 2*s.* 6*d.* per cubic foot) based upon his experience of the cost of recent buildings of similar type in a similar locality. Obviously a house on a mountain-side—ten miles from a station and with no more than a pony-track to approach the site—will be more costly than another of similar size in a suburban road. This rough-and-ready method of calculation sounds rather slap-dash, but is often surprisingly accurate if made by an experienced architect with a good head for business.

CHAPTER IV

STYLE AND FASHION

ALTHOUGH it is indisputable that planning (that is, the disposition of effective spaces) is the first stage in the process of designing a building, there may be some doubt in the minds of my readers whether structure should not take precedence of style as the second step. Incidentally, it is interesting to realize that, in an engineer's mind, structure certainly does come second, if not, indeed, first, and that no question of style arises to trouble him. If he is designing, for example, the dam or embankment of a reservoir, he is solely concerned with its retaining power; and 'style' comes into the picture only if he has to provide some small building such as a valve-chamber to stand on the embankment. In that case, he may call in some architect to 'art it up' externally, or may essay some experiment in 'Scottish Baronial' on his own, as in one case known to me.

A work of architecture, on the other hand, achieves that status because it is a work of imagination, expressing the personality of its architect. Before he decides how a flat roof is to be constructed, he has to make up his mind whether a flat roof is a desirable part of his design, or whether the roof shall be sloping. Either kind of roof can be constructed to resist the weather, so either kind is at his disposal. As for the common thesis that every architectural design should express its structure, that is—to my mind—a dangerous and fallacious doctrine if indiscriminately applied (cf. p. 40). The choice of available materials, and the manner in which they are utilized, are subservient to the architect's ultimate scheme or intention or design. As that design gradually takes shape, first in his mind and then on

paper, it is inextricably bound up with the manipulation of various forms evolved entirely at his pleasure. The translation of those forms into structure follows later. Thus the architect of a town hall must settle whether it is to be two or three storeys high, whether its façade is to be flush or curved or recessed, whether it is to have a central dome or a turret at one end, long before he need calculate the strength of its foundations or even decide whether it is to be faced with brick or stone.

If you turn to the huge volumes of the *New English Dictionary* to see how 'style' is defined, you may feel rather bewildered, for it has more than a score of principal meanings. Only one of them refers exclusively to architecture: 'a definite type of architecture, distinguished by special characteristics of structure or ornamentation, often with a prefix such as "the Gothic style," "the Classic style," etc.' But that definition does not quite meet my needs in this book, and perhaps another definition given in the same mammoth volume should be compared with the one already quoted: 'the manner in which a work of art is executed, regarded as characteristic of the individual artist. . . .' By 'style' in this chapter I mean the mode of expression selected by the architect to translate his preliminary plan of spaces into material form. He is bound to express his personality somehow in the process of design, because a whole series of decisions on form have to be made apart from the size and disposition of spaces; and he expresses his personality, or lack of it, even if he copies some precedent set by a contemporary, or by a Greek twenty-five centuries ago: he has made a choice of style even by that timorous act.

This fact again reminds us how radically the architect's work differs from that of the civil engineer. Can you imagine any modern engineer referring to Roman practice when designing a bridge or an aqueduct, though the Romans built most excellent bridges and aqueducts *in their day*? Probably engineers would be more civilized members of society if they did take a little more interest in history, but the fact remains that it forms no part of their obligatory studies; while architects, in order to obtain State licences to use the title of 'architect', are compelled to pass examinations in the 'historical styles' of architecture. Why this curious difference between the two professions?

Many of the ablest young architects of the present day, or at any rate many of those most prone to express their ideas in writing, have an open contempt for the use of all traditional styles of building;

that is, for the use of old-fashioned forms in the solution of modern building problems. 'A house,' they say—quoting their mentor who chooses to call himself *Le Corbusier* and is really a Swiss named Jeanneret—'is a machine to live in.' Then why study the Acropolis and the Colosseum? Solve your problem by approaching it from a strictly functional standpoint. If you have to design a railway station, make it look like a railway station, not like a Flemish town hall (St. Pancras) or a Greek temple (Euston). In an excellent little book published a few years ago* one of the younger school of English architects appears to make mincemeat of the argument just stated:—

'To ask what railway stations . . . should look like is generally considered impertinent—a mere trick to confound the critic. Yet it seems to me to be very pertinent. If my building, which is a railway station, must look like a railway station, I want to know what a railway station should look like. Should it be like Euston or St. Pancras or King's Cross, to name three that I know; or should it be like some other that I do not know? If it should be like any particular railway station, who decided that it should be so, and how was the architect of that station able to comply with the rules and make his building "like a railway station"? To all of which the critic might reply, "You know what I mean. A railway station should not look like an opera house. It should express its plan." Again I must ask what an opera house looks like, so that, assuming there be any danger of it, I can avoid making my railway station look like one. As for expressing the plan, how do I do that? Does it mean that I must differentiate between the doors to the rooms of the station-master and the assistant station-master? If so, how do I indicate which is which, without writing up their names, which would be a verbal and not an architectural means of doing so. If not, what exactly should I express, and where do I draw the line?'

All very smart and amusing, but not entirely convincing. I saw railway stations in Germany in 1914, *e.g.* at Leipzig, that seemed to me to express their purpose quite definitely, though neither I nor anybody else could prove it; and there are many other more recent examples abroad (cf. p. 98) that I have not seen. To me King's Cross Station is an ugly building, but suggestive of a railway station and nothing else. Some of the new stations on the Southern Railway, as also the two new stations at Exeter, are very honestly designed, yet all these vary greatly in style. As for the much-praised buildings above ground of the various new Underground stations

* *The Process of Architectural Tradition*, by W. A. Eden (London, 1942), pp. 41–2.

(see Plate 20) on the line to Cockfosters from Piccadilly, I cannot see anything distinctive of railways about them; on the other hand, they are not copied from any ancient monuments.

This brings us back to the real grievance of the advanced young architects of to-day, stupidly nicknamed 'modernists'; because there are modernists in every age, and within a generation they automatically become back numbers. Their grievance is that architects continue to imitate obsolete forms, or 'traditional' forms to use the more familiar term. These forms include Gothic tracery in modern churches, Classical 'Orders' on modern town halls and departmental stores, Tudor trimmings in modern college quadrangles, half timber anywhere and everywhere, even quiet neo-Georgian for dwelling-houses. Between the two extremes, where it is agreed by most level-headed folk that truth and wisdom are generally to be found, are those architects who hold that an intensive study of historical architecture before commencing practice extends their vocabulary without cramping their style. To take a few examples of recent buildings illustrated in this book, could you imagine Liverpool or Guildford Cathedrals being designed in the Middle Ages, or the new buildings of London or Leeds Universities being erected in Rome of the Caesars? Yet it is obvious that their respective architects have owed much to tradition. So far as the charge of mere slavish imitation goes, all these buildings are more original in their very different ways than many of the latest works of the modernists, which closely resemble the designs of leaders of the movement practising in Germany just before the present war. The 'traditionalists' hold that we have something to learn from a study of the past, the 'modernists' that we should start from scratch, ignoring the experience of our forefathers.

'Style' is something more than 'fashion': it is a matter of personal taste. Personal taste, that is a personal preference for certain forms as against others, is partly innate or instinctive, and partly—perhaps largely—acquired as a result of study and contacts. 'Design' is a subject of study in all schools of architecture, and involves decisions in matters of taste at every step. If the study of design is confined to contemporary examples, and those examples are limited strictly to the handful of buildings produced by the handful of modernists, the student's horizon is very restricted. He has few chances of making comparisons, of developing a critical faculty, or of being able to distinguish the good from the bad; for even in matters of taste there are some fairly permanent standards. If he ignores such comparative

study he tends to become a slave to fashion, which is nearly as fickle in architecture as in women's hats, and far more dangerous because its products are so terribly permanent. If the student can only tell you what is the *dernier cri* (usually from Central Europe or America), his choice is obsolete within a decade, perhaps within a year. If you have a friend who has taken a good degree in classics, you do not expect him *ipso facto* to be quoting Greek to you constantly; but you often find that he has an excellent literary judgment and a broad view of life. So an architect, who, as I have said in my first chapter, should have a sound general education, ought to be capable of diluting his scientific and practical studies with a thorough knowledge of bygone architecture, and yet avoid any slavish imitation of its forms. Most healthy and normal young English architects, if their minds are not poisoned at the outset, really enjoy sketching and measuring the noble historical buildings of which we ought to be proud.

Tradition in architecture, however, means something quite different from slavish imitation, in the minds of its most able exponents to-day. The term means that there has been a continuity of forms through the ages, modified by changes in discovery of new materials and methods, as well as by habits of life, yet persisting more or less continuously up to recent times and expressing something English at the end of it all. It is contended by its advocates that this tradition should be maintained, not jettisoned altogether because we have discovered such modern improvements as refrigerators and bakelite within the home, and aeroplanes and poison gas outside it. But the upholders of tradition are not entirely consistent in their advocacy. They all ascribe the origins of our Western architecture to Rome, and thus ultimately to Greece. They all see in the massive round arches and vaults of our Norman or 'Romanesque' buildings a natural development of Roman design. But the Gothic architecture that followed from about A.D. 1200 to 1500 presents a problem. It may be held that it was a normal step forward from the Norman 'style', and that its normal growth was completely interrupted by the introduction of Renaissance (*i.e.* revived Roman) forms from Italy in the sixteenth century. Others hold that the Gothic period was a mere interlude or episode or interruption, and that England resumed her traditional path in architecture when Inigo Jones re-converted her to Roman design at the beginning of the seventeenth century. I prefer to regard the whole thing as a swing of the pendulum, which occurred again about a century ago when

England was convulsed with what was called a 'Battle of the Styles' in architecture.

The battle was fought between two rival groups of confessed 'traditionalists': those who wished that Gothic forms should be revived for all forms of building, not for churches alone; and those who supported the view that, for secular buildings at least, Roman forms should be adopted as our natural and vernacular idiom in architecture. After a terrific tussle, Sir Charles Barry, the foremost architect of his day, who favoured Italian Renaissance design and erected several famous clubs in Pall Mall in that style, was induced to adopt the Gothic style for the new Houses of Parliament (1836–57), still standing. The Law Courts in the Strand (1866) by A. E. Street are also Gothic, and their interior arrangements, recalling those of the beautiful Papal Palace at Avignon, are as unpractical as they are picturesque. On the other hand, Sir Gilbert Scott, the greatest Gothicist of all, designed the Foreign Office block (1856) in the Italian style after a furious controversy had raged among politicians on this issue. For many years after this squabble had died down, and after St. Pancras Station and Hotel (1865) had marked one of the last flickers of medievalism in strictly utilitarian building, it was still held that Gothic was the stuff to use for all colleges and schools of sound learning as well as for churches (cf. p. 78).

The pendulum was swinging back again, and went from late Gothic to Tudor, from Tudor to Jacobean, and, about the beginning of this century, from Jacobean to 'Queen Anne' and Georgian. If you wish to understand what is happening to-day (when another 'Battle of the Styles' is in progress, temporarily damped down by the forcible arrest of all building during the war), it is necessary to picture for you, in a brief description, the fashions that prevailed between 1900 and 1910 or thereabouts. Nearly all churches continued to be neo-Gothic, that is Gothic of a sort, adapted to some extent but mainly a revised version of late or 'Perpendicular' Gothic. In 1902 Mr. (now Sir) Giles Gilbert Scott won the great competition for Liverpool Cathedral with a Gothic design, described on p. 74 and illustrated on page 32 (Fig. 1), at the early age of twenty-two. But eight years earlier J. F. Bentley had been instructed to design the huge new Roman Catholic Cathedral at Westminster in the 'Byzantine' style, although he himself favoured Gothic. He travelled abroad to collect ideas, and eventually produced a wonderful building which is much less Byzantine externally than internally, but is decidedly un-English in all its features.

For town halls, municipal and county buildings, clubs and banks, a rather heavy type of Renaissance (revived Roman) design was favoured almost everywhere. The London County Hall competition, in which nearly all the leading architects of the day took part, was won in 1908 by another unknown young man, Ralph Knott, at the age of twenty-nine. (Architecture, from a young man's point of view, has an advantage over other professions, in the opportunities it offers for sheer genius to reveal itself in this way.) Another notable London building in the 'free Classic' or Roman style was

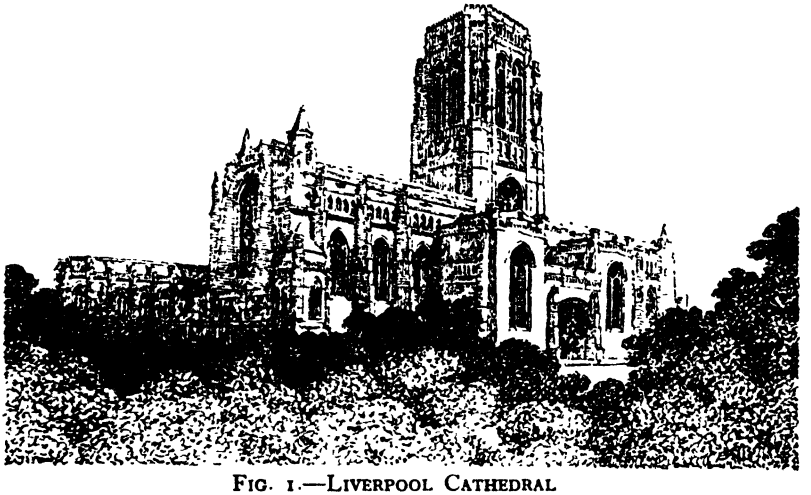
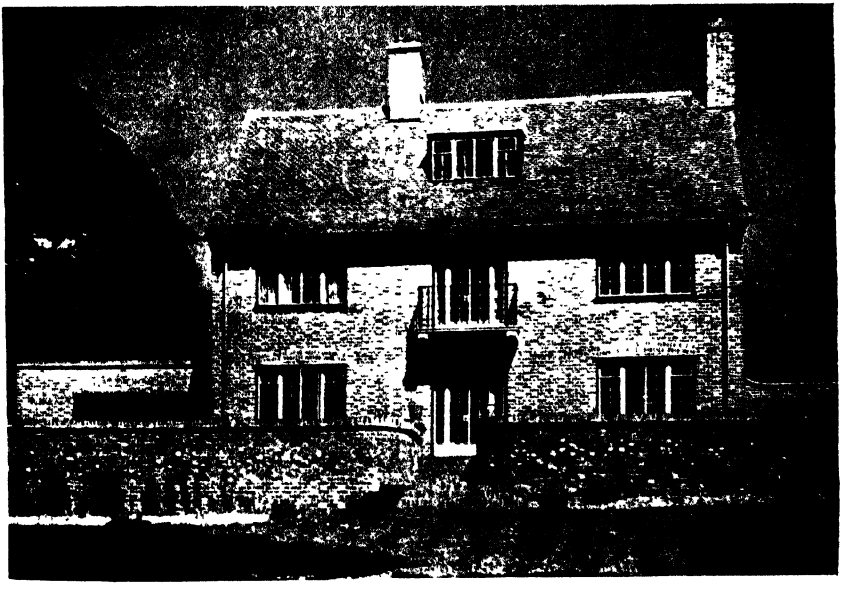


FIG. 1.—LIVERPOOL CATHEDRAL

the Piccadilly Hotel, designed by Norman Shaw, especially important because its frontage to Regent Street formed part of the famous 'Quadrant', and it was intended that its magnificent but ponderous façade should be repeated on both sides of the street. That intention had to be abandoned, however, because shopkeepers objected to the amount of space occupied by heavy masonry, restricting the window area on which their livelihood depended. Outside London, the finest buildings of the period are undoubtedly the noble town hall and law courts at Cardiff (1899), designed by Lanchester and Rickards in a free Renaissance style known as 'Baroque', popular in Southern Europe, especially Italy, two centuries ago. The Central Hall at Westminster (1905) is by the same firm.

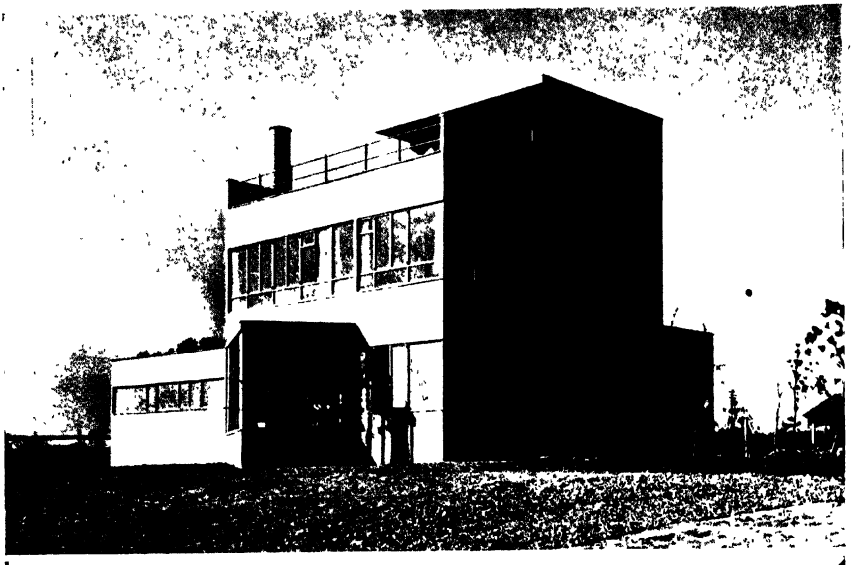
Meanwhile English domestic buildings, more particularly country houses and cottages, were the cynosure of all Europe about 1900. At that period they were based mostly upon Elizabethan or Jacobean



Above : House at Kingswood, Surrey. (By F. Bertram Last, A.R.I.B.A.)
Below : House near Leatherhead, Surrey. (By Oswald P. Milne, F.R.I.B.A.)

Photo: Architect and Building News

PLATE 7



A House in Sussex. (*By* Connell, Ward and Lucas, AA.R.I.B.A.)
(*above*) Exterior. *Photo: Architects' Journal*
(*below*) Interior of Lounge. *Photo: S. W. Newbery*

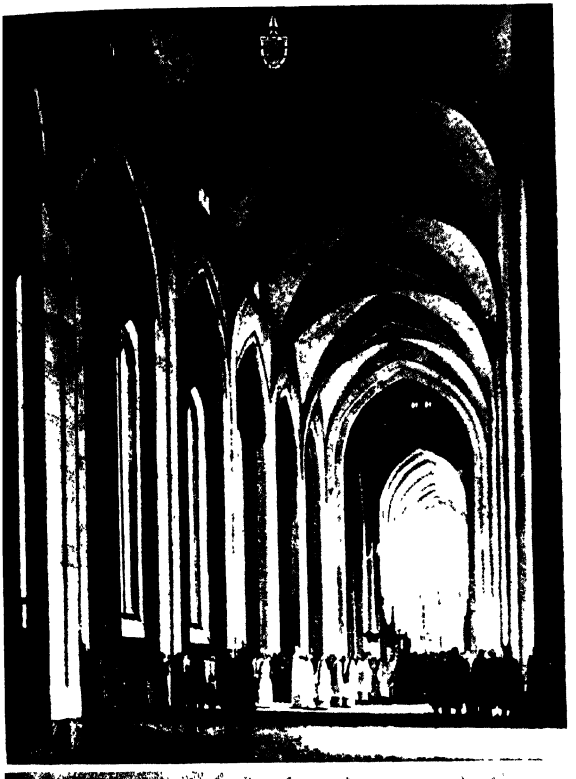
prototypes, with mullioned windows divided into small panes, rather steep roofs and bold chimneys. They were undeniably attractive, reasonably practical, and, above all, essentially English. Between about 1900 and 1914, when all building was interrupted by the Four Years War, the fashion was slowly changing from Jacobean to Georgian, and leaded lights gave place to the more sensible sash-windows which had been introduced into England from Holland in the days of William and Mary. Thus you will realize that, up to 1914, nearly all architect-designed buildings in this country followed the 'traditional' styles in a greater or less degree; and those buildings, mainly small villas, which were provided by speculative builders without architects, usually tended to copy, and generally to caricature unintentionally, architectural fashions of a generation earlier: there was always a considerable 'time-lag.'

After the Four Years War ended in 1918, a new style of architecture made its appearance across the Channel, where—especially in Germany—a few men were beginning to revolt against the blind imitation of traditional forms, and much more originality of design had resulted than in England. The great Wertheim store at Berlin (1904), for example, shows some attempt to express its modern system of construction. In Holland a huge programme of housing was carried out immediately after the war, and tradition was thrown to the winds. In France, the home of reinforced concrete, experiments to produce new forms in that very adaptable material were proving successful, and Le Corbusier published in 1924 a book entitled *Vers une Architecture*, which had an enormous vogue not only upon the Continent but also in this country. As I have already said, it was he who described a house as 'a machine to live in', and demanded that it should be designed as efficiently and functionally as an aeroplane, a ship, a locomotive, or a motor car. He jettisoned and derided all the historical 'styles', and his ideas spread like wildfire through the architectural schools. Actual building upon the lines he advocated did not, however, take place on a large scale. The older and therefore more established architects regarded his new gospel with some caution and suspicion, especially in England where traditions always die very hard. In Germany and the neighbouring countries 'packing-case' architecture (as its enemies describe it) began to spread rapidly, with its 'swift clean lines' (as its friends call them). But partly because its character was international rather than German, and partly because its chief exponents in Germany were Jews, Hitler shut down the

'Bauhaus' at Dessau (the centre and forcing-house of the new cult) in 1932, and its founder, Professor Gropius, together with Erich Mendelsohn and other apostles of modernism, fled to England. As you may read in *Mein Kampf*, Hitler as a boy desired to become an architect, but his failure to obtain his school certificate at sixteen led to his rejection when he applied for admission to the School of Architecture at Vienna, then to his drifting into bad company, and thence to all the troubles we now know so well. *Verbum sap.* At all events, he took revenge for his frustrated ambition, when he became powerful, by first outlawing or persecuting the Jewish architects who were producing what he considered un-German buildings, and then by deciding himself what the new architecture of Germany should be.

Thus there appeared in England, just before the war of 1939, a small group of extremely able refugee architects from Germany and elsewhere, with an unusual gift for publicity and propaganda. They soon converted to their views a number of equally able young English architects, and before long the pictures in some sections of the English architectural press consisted almost exclusively of illustrations of the comparatively few buildings erected by them in this country, and the much larger buildings which they had previously erected abroad. In 1934 Sir Reginald Blomfield, R.A. (d. 1943), the doyen of his profession and the greatest writer on architecture of his generation, published a book, *Modernismus*, in which he made a caustic but most amusing attack upon them and all their works. At the present time, when the whole building industry is temporarily paralysed, a pause is allowed us to consider whether we shall turn over a new leaf when it restarts, by adopting 'modernism' as our gospel for reconstruction; or whether we shall revert to our easy-going, perhaps illogical, and rather conservative English tendency to compromise with tradition. That is the 'line-up' for our next 'Battle of the Styles.'

The type of architecture favoured by Gropius, Le Corbusier, Mendelsohn and Co. may be seen at its best in this country in such buildings as the De la Warr Pavilion at Bexhill (1935), Embassy Court at Brighton (1936), and the great block of flats known as 'Highpoint' at Highgate near London (1938). All these buildings are very stark, very white, and very attractive. All have flat roofs, and none has any ornament whatsoever. None of them could possibly have been copied from any historical prototype, though perhaps it is permissible to suggest that their designers may have unconsciously



Guildford Cathedral, (*left*) Interior perspective, and (*below*) exterior, from a Model. (By Edward Maufe, A.R.A., F.R.I.B.A.)

Photos: S. W. Newbery

PLATE 9

All Saints' Church, Weston Green, Surrey, interior and exterior. (By Edward Maufe, A.R.A., F.R.I.B.A.)

absorbed some ideas of taste from the past. Not one of them is English in character, and probably the best places in the world to study the 'New Architecture' are the Jewish settlements at Haifa and Tel Aviv in Palestine. The young modernists who write in the press are as uncharitable to the 'traditionalists' as Sir Reginald Blomfield was to the modernists in his book mentioned on p. 34. 'Embassy Court' seems to stare with contemptuous arrogance over the dignified classical architecture of Regency Brighton, and some of the smaller houses erected by the wilder modernists have caused a commotion in the suburbs or villages where they have been planted.

Regarded from the point of view of quantity, the modernist movement has not yet begun to alter the face of England appreciably; but it has made such headway in the schools of architecture that it may play a substantial part in reconstruction after the war; provided that young architects can persuade their clients to adopt an entirely novel style of building, and also that the fashion has not changed once more before peace comes. It must be admitted that the new style, at its best, has much in its favour. The east wind from Central Europe has blown away many dusty cobwebs, and has probably cleared our vision. Undoubtedly there was too much sheer 'cribbing' of traditional features forty or even thirty years ago, too much meaningless use of the classical 'Orders', too little concentrated thought about the function and structure of each building. Nevertheless the pendulum has swung rather too violently. In their worship of ships and aeroplanes some of the hot-gospellers of modernism have spoken of 'clean *swift* lines' in architecture, whereas a prime function of a building is to be static. Keep its lines 'clean' by all means, but the streamlining of a house is certainly not functional, nor is it either clever or original to make a house look like a bit of a passenger liner: that is quite senseless imitation. Certain other features of the new architecture are also open to criticism: the liability of its flat wall-surfaces to become stained with soot and to 'craze' or crack; the resultant shabbiness as contrasted with the brilliant whiteness of the new surfaces when the clever stunt-photographer makes the pictures on which so much of the success of these buildings depends; the frequent failure of their flat roofs; troubles caused by the absence of cornices, and so on. Some of these matters will receive attention in the next chapter.

The difference between traditional style and ephemeral fashion consists, in my opinion, in the fact that the former resembles the Fabian attitude towards Socialism, relying on 'the inevitability of

gradualness' to work a slow change in bringing tried and trusted English methods into line with modern conditions of life; the other rejects the past *in toto*, and wants to start with a clean sheet on some new-fangled theory imported from overseas. Yet only forty years ago there was a similar craze of the moment, originating on the Continent and commonly known as *L'Art Nouveau*, which quickly ceased to be *nouveau* and was soon as dead as mutton. There is much that the latest modern movement has to teach us, as succeeding chapters of this book will show, but many of its merits may be grafted on to the English tradition, or merged in it, to the advantage of architecture.

Finally, it must be stated that the architect, in determining the style or fashion which his new building is to follow, should have some regard to its surroundings. This is, however, a very debatable principle, certainly not accepted by all modernists. Take, for example, the case of a large sixpenny bazaar to be erected in the main thoroughfare of Stratford-on-Avon, Chipping Campden, or Farnham. Should its familiar red and gold fascia be omitted; and should its front be faced with half-timber, stone and brick respectively to suit the *genius loci* of these famous historical towns? Is it a vandalistic and unneighbourly act to erect a staring white concrete house on the grey fells of West Yorkshire, or is it simply common sense? Further reference to some of these really difficult problems will be made in Chapter XVI, which deals briefly with commercial buildings (see p. 94).

CHAPTER V

STRUCTURE AND MATERIALS

If you pick up any text-book of Building Construction you will find that it begins with the foundations and follows the building from the bottom upwards, just in the way that the builder himself proceeds. On the other hand, if you watch a structural engineer at work with his slide-rule, you will find that he follows the opposite sequence, calculating first the 'load' on the roof and then adding the further loads on each floor, proceeding downwards, till he finally reaches the total accumulated load transmitted to the foundations. The architect who designs the building follows neither process, and it is rather difficult to explain at what point questions of structure first begin to exercise his mind consciously: if he is at all normal they must be there

subconsciously all the time. I have already said (p. 10) that his first task is 'planning': *i.e.* to assemble the required cubical spaces of his design in the most convenient and harmonious manner possible on the site; but during all the time that he is doing that, he must be considering—if indeed the choice is left to him—whether this is going to be a brick or stone building to suit his own or his client's taste, or to satisfy the *genius loci* of some old town; or whether, on the contrary, it is to be a stark white structure of reinforced concrete, proclaiming its author's challenge to the effete doctrines of traditionalism. He has also to make the important decision between an invisible flat roof, an almost invisible 'pitched' (sloping) roof of low pitch, or a steep roof which will naturally constitute a prominent feature in the design. Further choices are open to him in the material (*e.g.* slates of various kinds, tiles, lead, etc.) available for covering the type of roof chosen, the shape of windows to suit internal and external requirements, and so on all through the building. Most of these choices have to be made before questions of structural strength arise, but they cannot be made efficiently unless the architect himself has a sound and extensive knowledge of structural methods.

Of the decisions to be made by the architect, as just explained, perhaps the first will be the type of roof to be used. For some occult reason, a flat roof is nowadays held to be the hall-mark of international modernism, whereas the 'pitched' or sloping roof is traditionally English. The latter is also traditionally north-European and is characteristic of Germany, Holland, Belgium and Scandinavia as well as of England. The steepest roofs I have ever seen are in the districts near the Harz Mountains in Germany. If the architect wants a grey or blue or even a purple roof, he can make it as steep as he likes, but not less steep than 30 degrees: below that point there is a risk that driving rain will get between the slates and penetrate into the building. If, on the other hand, he wants a red roof, he uses tiles which must not be laid at a lower pitch than 45 degrees, for the same reason. He may wish to utilize the space inside the roof for rooms: in that case he can use a 'mansard' shape (so called after François Mansart, a French architect of the seventeenth century) which is very steeply sloped in its lower part, almost vertical in fact, and gently sloped in its upper part. With this type of roof, dormer windows are invariably used, but of course they are also needed to give light to attic bedrooms in roofs of less acute pitch. The advantage of a sloping roof is that, if reasonably well constructed, it is fairly certain to resist the weather; the disadvantage is that, if made of timber, its

construction is extremely complicated and involves points of support at frequent intervals. These influence and often hamper the architect in contriving the rooms and flues on the top floor. On the other hand, a flat roof has no such disadvantage: it is simply a lid, usually a concrete lid reinforced with steel and covered with asphalt, resting easily on any walls that happen to rise to the top of the building and punctured for chimneys wherever required. Nevertheless, though it can easily be constructed, its covering needs to be very skilfully done if the penetration of damp is to be averted, and bad workmanship in this respect has often led to failures. A further disadvantage is that a flat roof offers less resistance to direct heat and cold than a sloping roof with a flat ceiling and an air space between it and the rooms of the top storey. Another consideration very much in the public mind at present is the relative protection against bombs provided by the two types. It is possible to have a sloping roof, covered with tiles, but formed of steel and concrete as at the London County Hall: this is, of course, highly resistant to incendiaries; but the ordinary old-fashioned sloping timber roof was the cause of much of the damage resulting from incendiaries in air raids. It is now common knowledge that a thickness of six inches of reinforced concrete is the least protection that is sure to save you from the one kilo incendiary bomb; as for H.E. bombs, nobody needs to be told to-day that ordinary buildings cannot be made to resist a direct hit from the heaviest types.

One result of the air raids has been our increased but still very imperfect knowledge of the surprising effect of 'blast' as a disintegrating force. Again and again one sees buildings of ordinary construction (that is, of brick walls and with timber roofs covered with slates) that have simply collapsed like a pack of cards without ever being hit by a bomb, because of the lack of cohesion in their structure; while modern 'framed' buildings (that is, buildings with a framework of steel or reinforced concrete) have usually fared much better. This fact emphasises the essential difference between 'traditional' building construction and modern framed construction, which has only become general for large commercial buildings within the last half century, and has only just begun to come into occasional use for houses within the last decade. Formerly the weight of the roof was transmitted continuously on to a 'wall-plate' fixed horizontally along the top of the wall, or concentrated by means of trusses on to certain points of support ('piers'), which were formed by thickening the wall at those points. The latter system was adopted in Gothic

architecture and may be seen at its zenith in such late Gothic buildings as King's College Chapel, Cambridge (1446–1515), where the weight has been so ingeniously concentrated on to skilfully buttressed but very slender piers that the whole of the intervening space is filled with large stained-glass windows or thin panels of ornamental stonework. But marvellously skilful as much of that work is, most commercial buildings of ordinary construction up to fifty years ago, and nearly all houses right up to date, are incapable of resisting a violent and sudden impact from a transverse or oblique direction, such as occurs with bomb blast: it simply shakes them to bits. The roof merely rests on the top of the wall, or at most is secured to it by a few bolts. For the most part, its own weight is relied upon to keep it in position. Wind pressures in this country, even in the most exposed positions, are seldom of cyclonic force, and it is very rare for a roof to be blown right off a building by any gale.

Wooden floors, too, are not securely anchored to the walls or piers. The ends of the girders or joists which carry them are merely built into recesses in the wall, and those recesses weaken the structure rather than strengthen it: certainly the floors do not knit the walls together in ordinary houses or in old-fashioned business buildings. As for the actual fabric of the wall, already pierced for doors and windows and honeycombed with recesses to take the ends of floor-joists, it is composed of innumerable separate units (bricks) held together by mortar of varying quality. The required thickness of any solid brick wall may usually be ascertained, without calculation, by reference to the local by-laws, which differentiate between 'domestic buildings' and 'buildings of the warehouse class'; and prescribe minimum thicknesses according to the height of the wall, its length between 'cross walls', and the number of storeys through which it passes. These by-laws, however, did not foresee Hitler, or the march of science which has given us the bombing aeroplane; and the ordinary small house—which is quite strong enough to remain upright and to resist the worst our fickle climate can do, for a century or two—cannot resist blast or incendiaries, quite apart from direct hits.

The first framed buildings in this country were constructed of steel stanchions (upright members) and girders (horizontal members) bolted and riveted together, the roof being tied to the structure in the same way; but it was soon discovered that a building of this type could not resist any fierce fire, so a clause had to be added to the by-laws requiring all steel structural members to be cased in concrete,

terra-cotta, or other fire-resisting material. Concrete has great strength in compression, steel in tension, so it was soon realized that, if concrete had to be used to case the steelwork, it might as well be made to do part of the structural work at the same time. Hence the introduction, first in France and then in England, of 'reinforced concrete', now so largely used in the construction of framed buildings. The steel rods and bars which form its skeleton are comparatively light, and thus it follows that reinforced concrete or 'ferro-concrete' structures can easily be moulded into almost any desired form. They also have a homogeneous frame or skeleton which resists lateral thrusts, including blast, fairly well; but often the panels, or thin walls, between the main members of the external frame fall outwards or are blown inwards, leaving the framework itself intact.

The facing or casing of a framed building may consist of almost any material that the fancy of the designer selects, or that he is instructed to adopt. Thus in Regent Street there is a great block called 'Linen House', presumably a framed building. Most of the façade consists of the Portland stone that is required by the Crown landlords, but the lower part is of polished granite, the colour and texture of chocolate. One may surmise that it was the wish of the tenants to advertise their shirts that led to this somewhat unneighbourly decision, but why chocolate? In Fleet Street there is another building that caused a great sensation in its day—the *Daily Express* offices—clad from head to foot with glass, partly transparent and partly opaque black. I remember watching with horror the clothing of a framed building in Cairo, during the last war, with a thin coat of Italian brickwork, imitating a Bolognese palace of the sixteenth century; but, after all, every sort of traditional material—Gothic and classic masonry, even half timber of the most expensive kind—has been unblushingly gummed on to modern framed buildings in London during our own time; and Selfridge's huge building with its lavish use of the Roman 'Orders' is characteristic of its day (see p. 94). It is not surprising that many young architects have become tired of this illogical habit of dressing-up modern framed structures with obsolete forms giving no indication of what lies behind; on the other hand, there is no absolute rule of aesthetics or even of common sense which compels us to express every detail of human or architectural anatomy. Gothic architecture is often, and rightly, commended for its truthfulness in expressing structure, but it is not always consistently truthful. Thus the famous west fronts of Peterborough and

Wells Cathedrals are screens or façades with little relation to what lies behind them, resembling in that respect the startling west fronts of many Baroque churches. Again many of the lovely carved wooden screens in our West Country churches are decorated with buttresses and fan-vaulting and battlements copied quite meaninglessly from structural stone features.

With a framed structure, then, an architect is free to express his ideas in almost any known material. If he should favour the smooth white cement surfaces popular among 'modernists' at the moment, he must remember that, however charming they may look in their first freshness when a smart photographer catches them against a dark blue sky on a carefully selected sunny day, they will look much less attractive on a dull day even at the outset, and will soon become really shabby, especially in towns, unless they are periodically whitened at considerable expense. They are also liable, as I have said, to crack or 'craze'. Good brickwork, on the other hand, retains its colour and has a texture which gives a pleasing sense of variety in almost any weather. Portland stone, as is well known, was introduced into London by Wren after the Great Fire of 1666, and resists London soot remarkably well, looking white and clean in sunshine after two centuries of exposure.

For all substantial buildings, floors are constructed of reinforced concrete or some other fire-proof material, and may be covered with wood blocks or even with wood boarding, if desired. Their strength has to be calculated according to the 'dead' loads or 'live' loads which each floor has to bear. The 'dead' load is the weight of the floor itself plus any structural fixtures which it may carry; the 'live' load consists not only of the maximum number of people who may be assumed to be standing or sitting or lying upon it, but also of all furniture, fittings, machinery and stores which are liable to be placed upon it at any one time. The structural engineer, as already remarked, when he has to calculate the strength of the various members of a framed building planned by the architect, begins with the roof, where he has to allow for a maximum assumed wind pressure as well as a 'dead' load. He then works out the load on each floor, allots it to each girder and stanchion as he proceeds gradually downwards, and finally ascertains what load is transmitted to the foundation at the foot of each stanchion. The area (size) of each foundation slab is much larger than that of the stanchion or pier under which it lies, so that the load is distributed over a wide area of ground. Thus, if a pier, 2 ft. square, is carrying 50 tons and the ground beneath it is

capable of bearing only $2\frac{1}{2}$ tons per square foot safely, the foundation slab of concrete must be $\frac{50}{2 \cdot 5} = 20$ square feet in area, say $4\frac{1}{2}$ feet square, and of adequate thickness. In a previous chapter (p. 18) I have said something about the new science of 'Soil Mechanics,' by which it is possible to determine accurately rather than empirically the load per square foot that any given soil will carry.

The design of chimneys and the flues that they contain is one of the

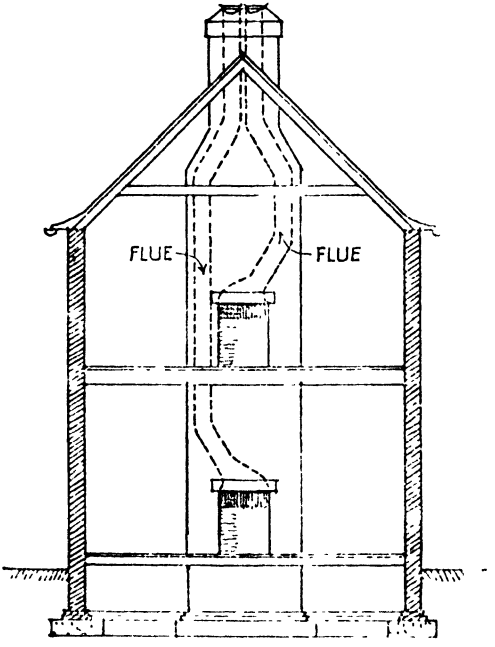


FIG. 2.—CHIMNEYS AND FLUES

most difficult things in the planning of an ordinary dwelling-house. At the top of each fireplace, which is much larger than the flue above it, the brickwork has to be contracted down ('gathered in') to a space 9 inches square, the standard size of a flue, and also bent sharply sideways so that a sudden down-draught does not fill the room with smoke. Between this point and the chimney-pot at the top of the flue there must be at least one more bend, for the same reason; and the flue from the lowest floor must be carried up round the fireplace above it, inside the brickwork on the left or right of that fireplace. The two flues must then be brought together into a 'chimney-stack.' The chimney-pots are smaller than the flues, and thus help to reduce

down-draught still more. The chimneys that occur between each pair of town houses consisting of, say, five storeys, including the basement, contain as many as twenty flues; that is, two on each floor for each house, so the need to compress them into as small a space as possible is obvious. In detached houses it is more economical to concentrate the fireplaces and flues, as much as possible, in the centre of the house, not on the outside walls, and this adds to the problems of the planner, who also has to consider the external effect of the chimneys as a feature, usually an important feature of the design. Nevertheless, it sometimes happens that wind currents due to adjoining hillsides or trees upset all these precautions and create down-draught or 'smoky chimneys' when the wind is in a certain direction.

In desperate cases it may be necessary to fit a cowl to the top of an incurably smoky chimney, but it is preferable to try first one of the less unsightly 'Edwardian' or similar patent chimney-pots.

Doors and windows, so recently as forty years ago, were nearly all made of wood by the general contractor. Nowadays, if they are made of wood at all, most of them are manufactured in vast numbers on mass-production methods and from standardized designs, either in this country or in towns on the shores of the Baltic. Doors are more often 'flush' than panelled or 'framed', and have a facing of plywood on each side, with an invisible backing of cheap wood in comparatively small pieces. Everything depends upon the workmanship, and the quality of the glue used: you are at the mercy of the manufacturer, for you cannot see what is hidden by the slick polished surface, whereas in the case of the older-fashioned panelled doors the whole framework of solid wood was visible. Windows are more and more coming to be made of steel, and the principal manufacturers offer a wide range of sizes and shapes from which the architect may choose. This range has been reduced under the exigencies of war, but if care is exercised in selecting sensible designs for standardization and 'pre-fabrication', the architect should still be able to find a sufficient range to satisfy his taste. Whether he can or cannot, the whole trend of modern construction is drifting that way, and the days have probably gone for ever when the architect expected to design every door, window, chimney-piece and cupboard as his fancy or his client directed. At the same time we must anticipate not only an increased use of plywood doors covered with veneer, and windows of steel instead of wood, but a further substitution of

plastics, such as 'bakelite', for many fittings hitherto made of wood or metal.

So far, I have spoken only of pre-fabricated components in a house—windows and the like—but there is much talk nowadays of pre-fabricated houses. The idea is by no means new. Wooden garages and huts have long been supplied in sections which only require bolting together on the site; and, after the Four Years War of 1914–18, an attempt was made to meet the shortage of labour and material prevailing during the 'Homes for Heroes' campaign, which I shall mention in Chapter IX, by providing houses with a factory-made steel frame—the chief examples being the 'Atholl House' and the 'Weir House.' Although these efforts were initiated by enterprising and competent firms, for some reason they fell flat, or fairly flat, and the old fashion of bricks and mortar resumed its previous popularity. The same fate befell numerous attempts to introduce houses built of concrete blocks, designed to save bricklayers' time. There have also been efforts to import ready-made timber houses from abroad.

Several types of pre-fabricated houses were brought into use on a large scale when the recent war ended, for it was realised that only by that means could our urgent need of cottages be met speedily enough to satisfy the demands of demobilized soldiers returning home and civilians whose dwellings had been destroyed by bombing. Obviously it would save time if all the parts of the structure, including the sanitary fittings and pipes, could be made in a factory, delivered in numbered sections to the site on a lorry, and erected in a few days. Plastering would be replaced by 'plaster-boards' nailed to the framing of walls, partitions and ceilings; and sheets of plywood would replace floorboards. This system could be applied, however, only to buildings required in quantity, such as small houses; and in any case it remains to be seen whether it would replace normal methods in popular esteem, or whether it would be merely an expedient to tide us over an emergency. As I have explained in my Preface, this little book is concerned rather with normal peace-time methods of building than with war-time substitutes adopted because of abnormal shortage of labour and materials. Nevertheless, we may confidently expect a great increase of standardization and pre-fabrication in the details of all buildings of the future.

CHAPTER VI

KEEPING OUT DAMP

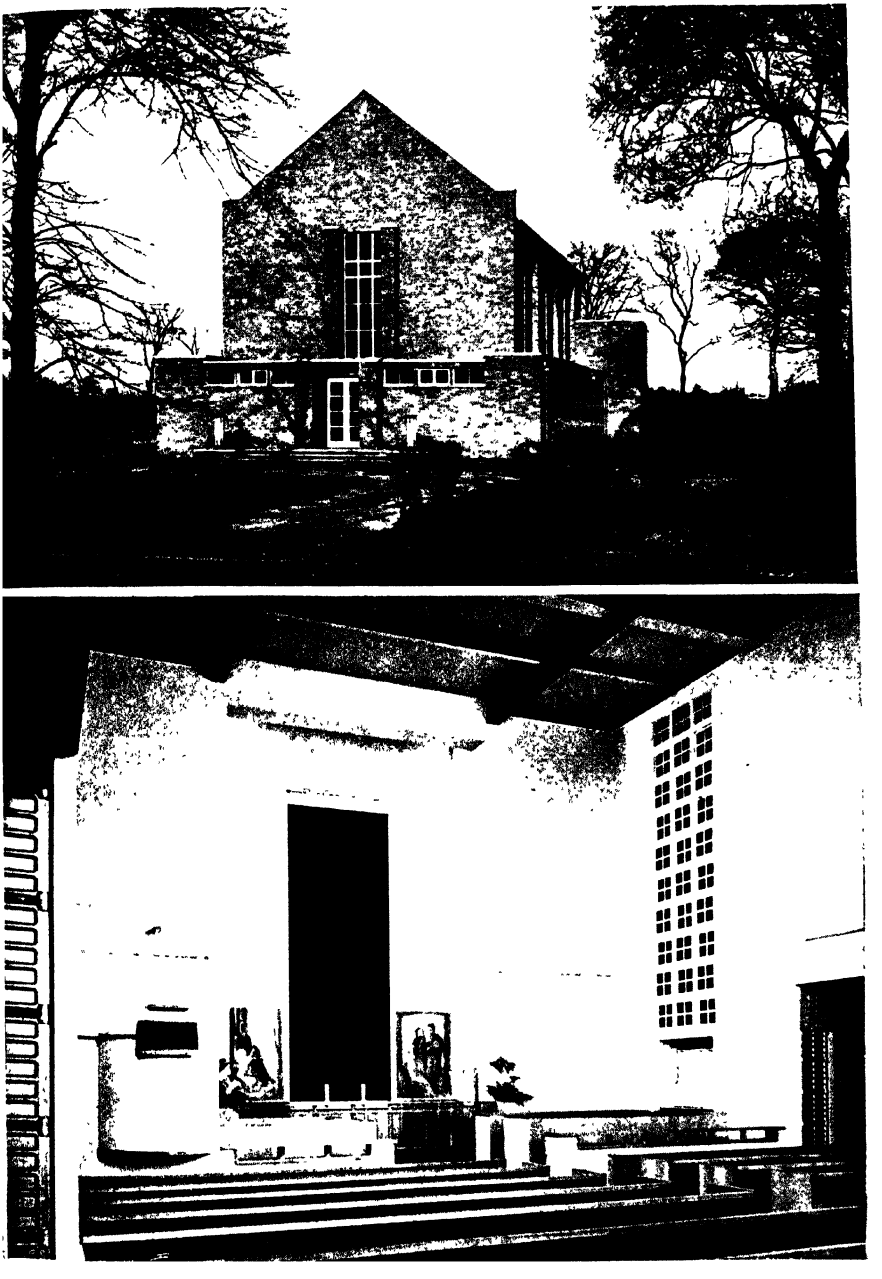
IN a sea-girt island like ours, even on 'the drier side of England' and far more so on Dartmoor or the mountains of Cumberland, the exclusion of damp is one of the major problems in building; whereas in some parts of Egypt there are places where rainfall is negligible or even nil. It must be remembered, moreover, that modern building is in itself a very wet business. A biologist can tell you exactly how many pints of water there are in a human body, but it is doubtful whether even the scientists at the Building Research Station could tell you how many gallons of water are absorbed into the components of a small house before it is finally 'dried out.' Bricks are moulded from wet clay, baked in kilns, but wetted again when they are laid to form walls. They are then bedded in mortar composed of sand, lime or cement, and water. Then the walls and ceilings are plastered with several coats of a wet mixture. The concrete used to cover the site, to form the foundations, and to span the openings over doorways and under hearths, is shovelled from barrows in a semi-liquid condition. Even the timber used in the roof, in floor boards, in doors, windows, staircases and cupboards has a so-called 'moisture-content', and if that moisture-content exceeds a certain percentage you may expect trouble later with shrinkages leading to warping and to draughts; so it is most desirable that only well-seasoned timber should be used. Many of the unpleasant mishaps that occur in modern building are due to this *internal* dampness, and are often caused by the desire of the 'client' to obtain possession of the building so quickly that time is not allowed for the 'drying-out' process to take place after each stage.

One common result is to be seen in wood-block floors laid too soon on concrete that is still 'green' (*i.e.* not really dry). I once saw one shocking example in the costly polished floor of the new Great Hall of a university college, which had risen in billowing waves, though still all in one huge sheet because the small blocks were ingeniously dowelled and stuck together. Another frequent source of trouble is the peeling or discoloration of distemper applied too soon to plaster surfaces which were still damp when the work was done. Various ingenious alternatives to this prodigal use of water in building have been suggested: *e.g.* the 'Novadom' system of brick wall construction

in which layers of thick bituminous material are substituted for mortar joints; and all sorts of patent fibrous sheets or boards to replace plaster for ceilings. The latest type of modern buildings in concrete involve at least as much internal damp as any of the older 'traditional' methods.

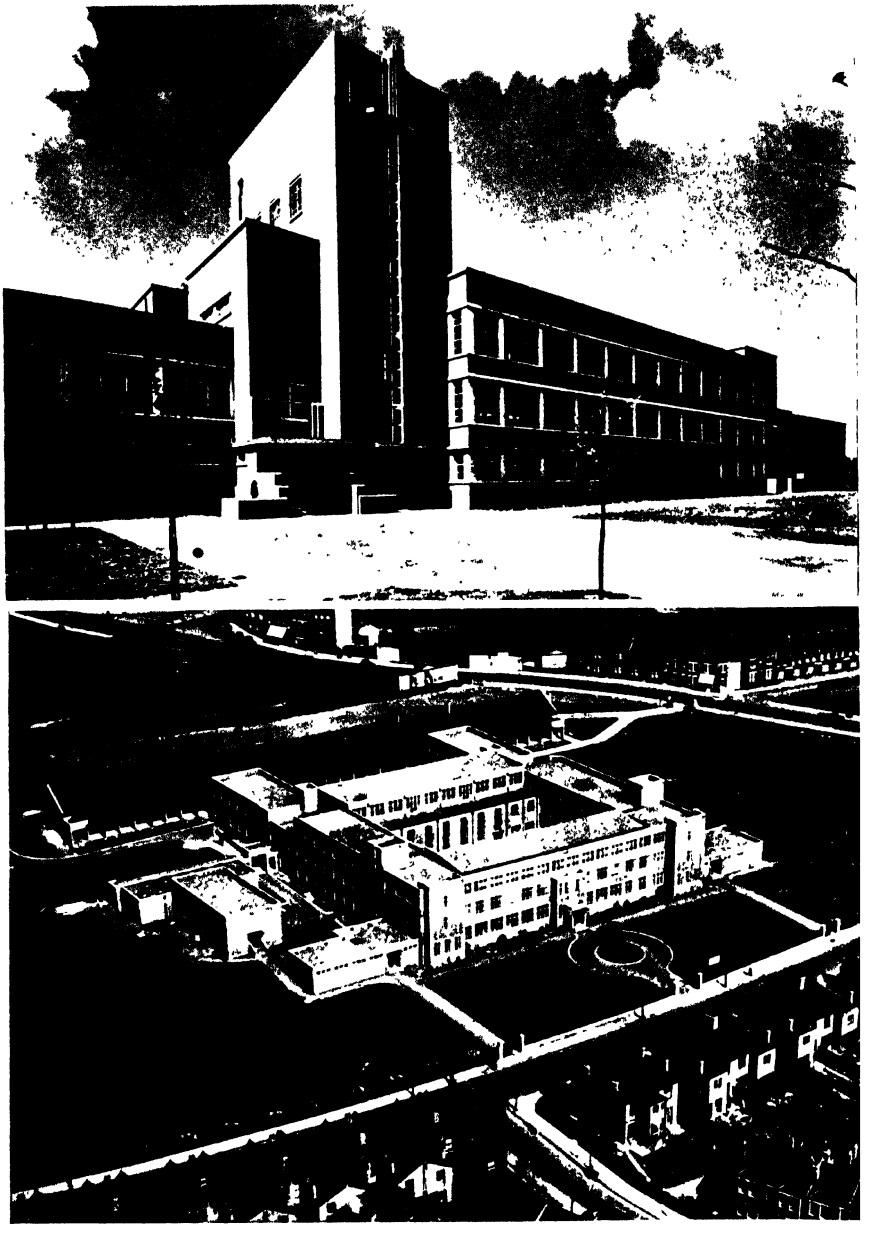
External damp may penetrate into a building vertically and obliquely through the roof and chimneys, laterally and obliquely through the walls and windows, or vertically upwards from the ground by means of capillary attraction. An architect or surveyor or builder called in, as frequently happens, to explain and cure dampness in a building needs technical knowledge as well as common sense in order to make his diagnosis. A slated or tiled roof laid to the slopes mentioned on p. 37 should resist anything short of a cloudburst if the slates or tiles are properly lapped over one another: the usual rule is that there should be three thicknesses over every nail-hole and two thicknesses elsewhere. In building of good quality there is a layer of bituminized felt and then a layer of close thin boarding beneath the tiles or slates: these layers keep the house warm but also afford valuable protection against damp. The eaves-gutters and rain-water pipes should be capable of taking away the water from the slated or tiled roofs when a downpour is on, and should be regularly cleared of leaves after every autumn. Where a brick or stone chimney emerges through a sloping roof of tiles or slates, the dangerous line of junction is sealed by a rather elaborate arrangement of lead 'flashings' and gutters, too complicated to describe here, and indeed sufficiently perplexing to the average architectural student. Just above the point of junction with the roof a 'damp-course' (as described on p. 48) should be inserted in the brickwork of the chimney, so that water which may penetrate the brickwork shall not run down into the building.

Flat roofs depend for their damp-resisting properties upon the workmanship employed. If covered with lead they are not literally flat but are laid to a very slight slope with joints so formed as to allow the lead to expand and contract with changes of temperature. An asphalt roof is jointless and is laid hot in a semi-liquid state, in two coats; but it, too, 'feels the heat' in summer and is liable to 'cockle up' under strong sun, and then to crack. To obviate this danger it is often covered with large tiles, white or red, forming an attractive terrace flooring; or even with a layer of loose clinker to break the heat of the sun's rays. The weak point is at the angle where the flat roof touches the surrounding parapet and is very liable to crack.



Methodist Church at Timperley, Cheshire (exterior and interior). (*By* Chippindale and Needham, AA.R.I.B.A.)

PLATE II



Technical Colleges (*above*) at Twickenham, and (*below*) Willesden. (*Both by* W. T Curtis and H. W. Burchett, FF.R.I.B.A.)

Lower photo: Aero Pictorial, Lt

Fig. 3 shows how this may be avoided by turning up the asphalt in the form of a 'fillet' and a skirting which is tucked into the joint of the brick parapet. Many modern flat roofs have no parapet, but they present other problems.

Coming next to the penetration of damp through the external walls, this is usually avoided nowadays, in the case of dwelling-houses and other buildings of ordinary construction, by forming such walls in

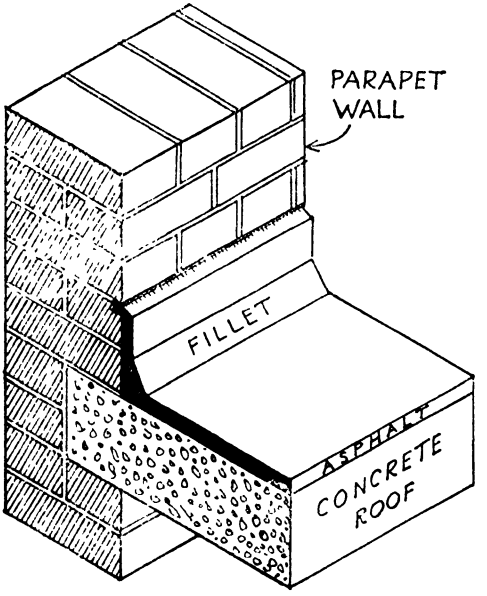


FIG 3.—FLAT ROOF AND PARAPET

two thicknesses, separated by a hollow space or cavity two inches wide and connected only by 'bonding irons' or 'cavity irons' or ties, inserted at regular and frequent intervals. These ties are twisted. Thus any water which may penetrate the outer thickness will not run along the iron tie, but will be deflected by the twist and will therefore drop to the bottom of the cavity. The building of walls is, however, a fairly rough-and-ready business—quite unlike a laboratory experiment —and a lazy bricklayer will seldom trouble to remove any lumps of wet mortar that may have dropped from above and lodged on the top of the cavity irons, thus forming an excellent bridge along which water will find its way to the inner wall and thence into the building. 'Cavity walls' were actually invented nearly a century ago, but were not in common use before 1900. They provide a more reliable

resistance to the penetration of damp than solid walls of greater thickness do, and are stronger than one might suppose. Small houses and cottages frequently have solid brick walls nine inches thick but covered with stucco or rough-cast as a protection against driving rain: this is a satisfactory method if both workmanship and materials are sound. Special precautions must be taken at the points where

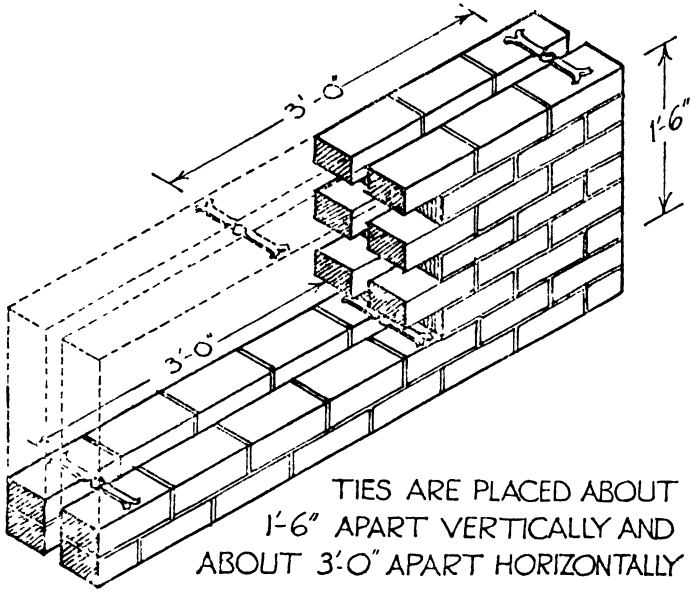
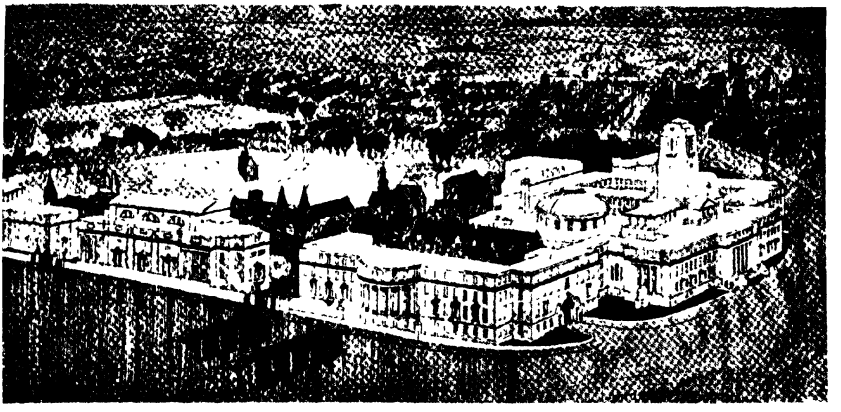


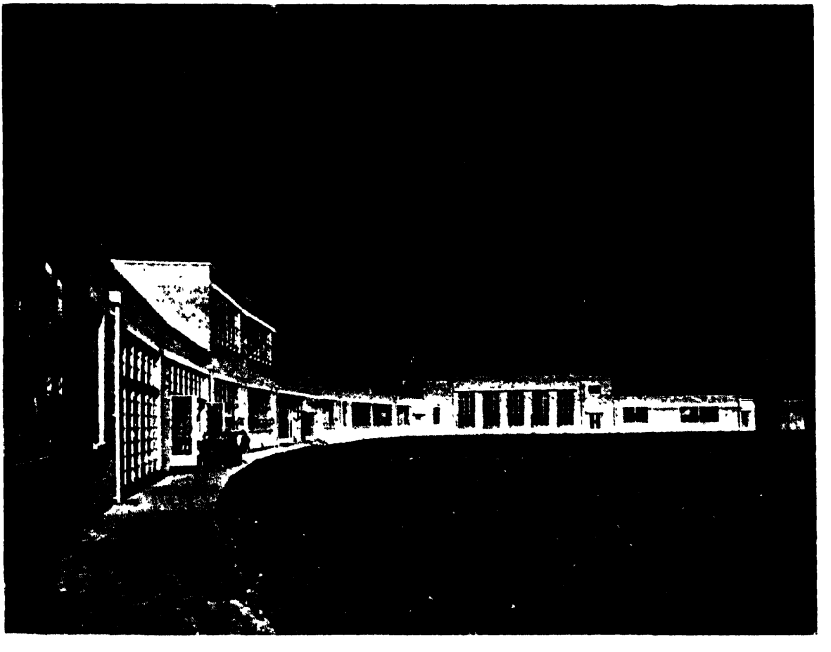
FIG. 4.—CAVITY WALLS

windows and doors are fixed in external cavity walls, for these are the danger points where damp may enter.

At the foot of the wall, just above the level of the surrounding ground, a 'damp-course' is inserted in all modern houses, though the idea is less than a century old. If your own home is of brick or stone, and reasonably modern, you can easily trace the damp-course because it looks like an extra-wide mortar joint. It should be at least six inches above the adjoining path or turf or flower-bed; and, if subsequent gardening operations have heaped earth higher than its original level, steps should be taken to scoop away the offending soil; otherwise the purpose of the damp-course is defeated. It consists of an impervious and continuous layer of slates in cement, or asphalt, or some bituminous compound, and prevents damp rising up the wall from the damp earth by capillary attraction. Generally you will



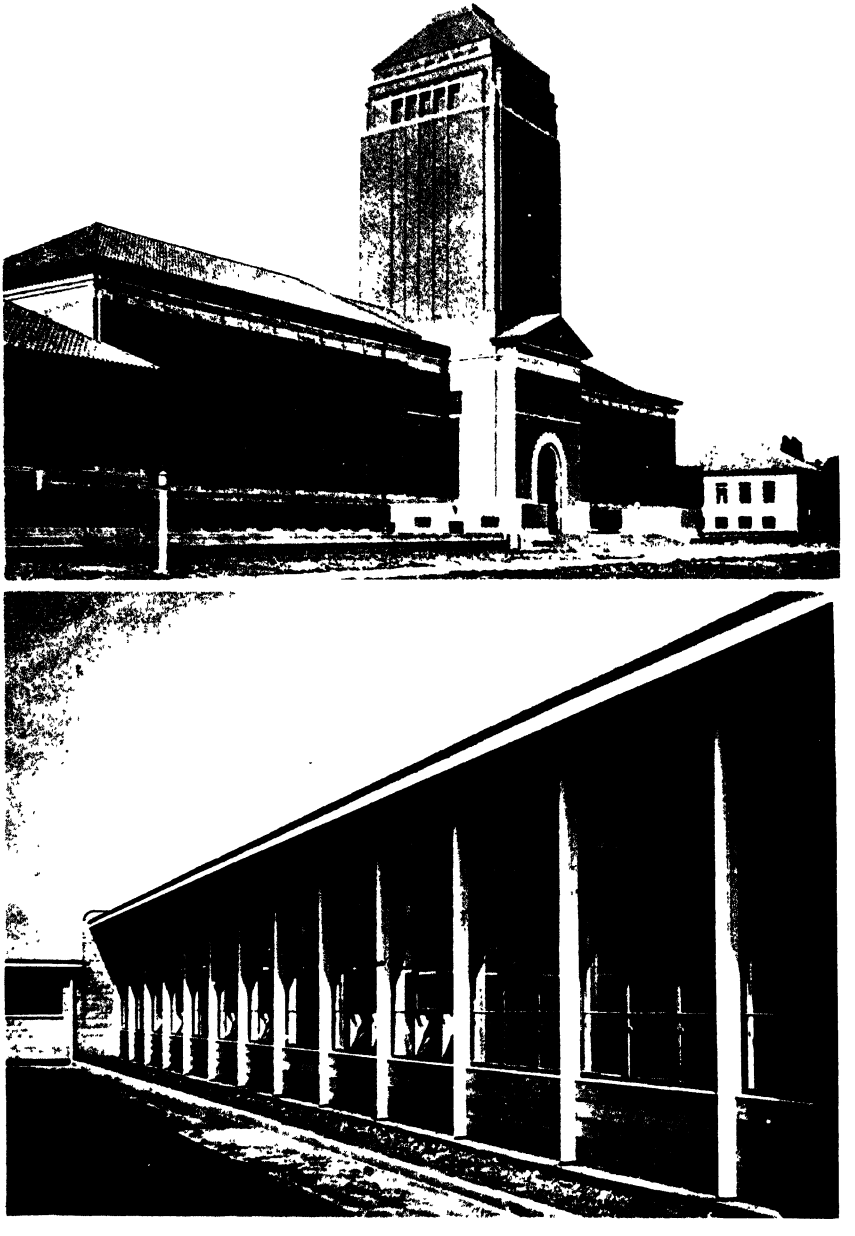
Leeds University. (*By* Lanchester and Lodge, FF.R.I.B.A.)



Bottisham Village College, Cambridgeshire. (*By* S. E. Urwin, A.R.I.B.A.)

Photo: Architects' Journal

PLATE 13



Above : Cambridge University Library. (*By* Sir Giles Scott, R.A., F.R.I.B.A.)
Below : Open Air School in West Sussex. (*By* C. G. Stillman, F.R.I.B.A.)

find that the brickwork of the wall is clean and dry above the damp-course, but greenish and damp below it. Modern by-laws insist upon the provision of a damp-course in every habitable building; they also

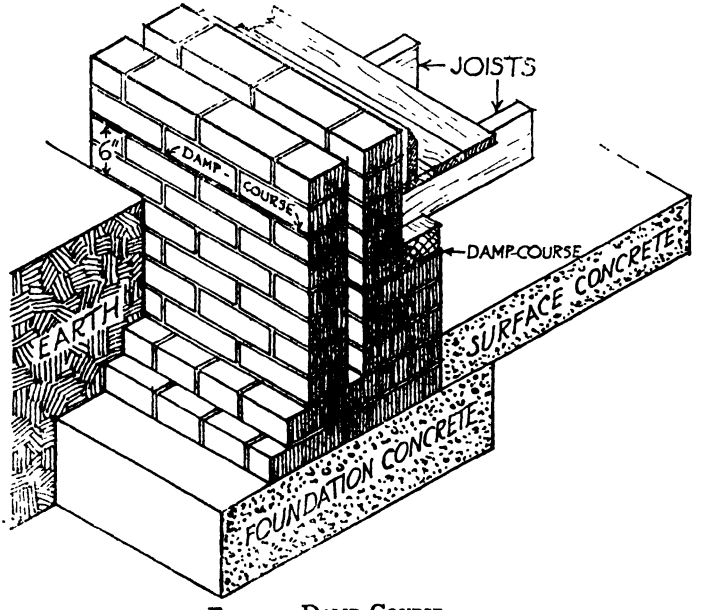


FIG 5 —DAMP-COURSE

require that the whole of the ground beneath the building shall be covered with an impervious layer of cement concrete to prevent damp air rising from the earth.

CHAPTER VII

KEEPING CLEAN AND SAVING LABOUR

EVEN before the recent war the shortage of domestic servants throughout the country had made people begin to turn their attention to the possibility of reducing all domestic duties, or 'chores' as they are commonly called. Now that there is such an urgent call for man-power and at the same time such a frantic demand for women to replace men, the need for saving every possible item of labour in the

home has been violently thrust upon the intimate notice of many clever and prosperous people whose brains should be capable of solving problems which they have ignored so long as Mary Jane has been available at their beck and call. The changed conditions to-day apply to all buildings in some degree, but most of all to our dwelling-houses, which, as we are constantly reminded, are the 'woman's sphere', so the problem lies mainly with women to solve. Too often the blame for inconvenient houses is laid at the architect's door, but it must be stated here that, although some architects have designed inconvenient houses, the homes which come in for the fiercest criticism on the grounds of inconvenience never had any architect connected with their genesis; and were erected by speculative builders to meet the demands of the day. This chapter may be able to prove that women themselves hitherto, in their affection for lace curtains, whitened door-steps, brass knockers and other items involving constant work, have added unnecessarily to their own labours.

Of those labours, and nobody denies that they are considerable, the heaviest probably consists in the endless cleaning and scrubbing and washing and dusting of the various rooms of the house. The causes of the work may be ascribed to soot in the air, to the use of unsuitable materials in the construction, equipment and decoration of the building; and to the accumulation of superfluous furniture, hangings, personal possessions and 'junk' generally.

Beginning with the smoke nuisance, it is true that people who live in the country are spared the worst of it, but I have seen it stated somewhere that, in certain atmospheric conditions, the smoke of industrial Lancashire reaches the Lake District, at least sixty miles away. Even so long ago as 1700, one Timothy Nourse wrote that the smoke of 'Sea-Coal' burnt in London could be 'smelt and tasted at some miles' distance.' Recent figures show that the deposit of solid matter from the atmosphere is eight times as much per acre at Newcastle-on-Tyne as it is at Malvern, and that in the great industrial towns of the North of England the duration of sunshine in the winter months is less than half the amount in neighbouring country areas; thus, over a period of eight years, the amount of sunshine in a suburb seven miles out of Manchester was two and a half times as much as in the centre of the town. Nor is the London area much better: it is only seven miles from London to Kew where, sixty years ago, there was five times as much sunshine as in the City, and even now there is twice as much. Yet, even at Kew, it costs £100 to wash the glass-houses after every London fog; and it has been estimated that the

cost of replacing dead plants in the Manchester parks is twenty times as much as it would be in a rural area. The cost of redecorating shops and banks has been found to be twice as much in large towns as in small towns; and the replacing of stonework damaged by the accumulation of soot costs the nation much more than £2,000,000 per annum.

Of our greater cities, Leicester always seems to me to be much the cleanest; partly perhaps because it depends mainly on light industries, but partly too because its city fathers have utilized statutory powers to prevent the emission of smoke from its factory chimneys. These powers, however, are limited to industrial plants, which certainly cause most of the trouble in the northern cities, but they do not apply to domestic grates, which in London cause two-thirds of the smoke-pollution. The amazing clearness of the air over London during the coal strike some years ago was a revelation. On clear days in summer I can see, from the hill-top where I live north-west of London, right across the western suburbs and Kensington to the fine chimneys of Battersea Power Station, sharply defined, and beyond them to the North Downs, twenty-five miles away. There is an organization known as the Smoke Abatement League which is doing good work and recently held an exhibition at the Science Museum in London. A few years ago this League published a pamphlet of suggestions for reducing the smoke nuisance in the buildings to be erected after the war, and they are of considerable interest.

The bituminous coal used in the ordinary domestic grate is not only the worst for creating smoke, but also produces a peculiarly tarry and greasy kind of soot. Coke, which can be used in closed boilers and is the normal fuel for heating factories and large buildings, is much less troublesome, but cannot be burned in an open grate. The so-called 'smokeless' fuels, produced by low-temperature carbonization, are much more satisfactory, but the supply is limited, the cost prohibitive for most people, and the fact that they cannot easily be burned in an ordinary grate is an obstacle. The most obvious need seems to be to remove these hindrances by means of research, including research into the design of fireplaces, before the war is over; for it is certain that most English people love an open fire in at least one of their rooms, otherwise the general introduction of coke-fired central heating would solve many of our problems. (These matters are discussed further in the next chapter.) In all buildings except dwelling-houses, the prohibition of open fires would do much to improve matters, and the exercise of the powers which

municipalities already possess for the control of industrial smoke should be largely extended.

So much for the smoke nuisance and means for dealing with it at the source and in the future. Nevertheless, it cannot be entirely removed; so we must see what the architect and builder can do to reduce all the labour it entails inside and outside buildings. This is really a very simple problem, for most of the trouble is caused by the lodgment of dust and dirt on all horizontal surfaces, and in a less degree on such vertical surfaces as have a 'matt' finish, *i.e.* not

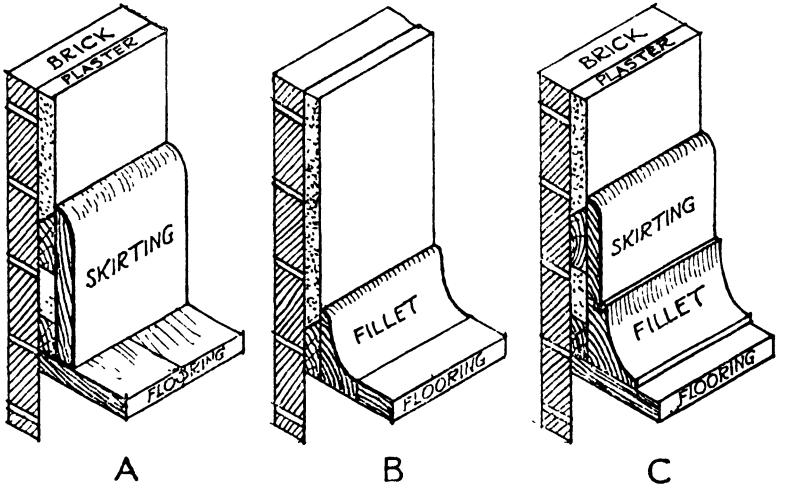


FIG. 6.—SKIRTINGS

smooth. Among 'horizontal surfaces' one should include floors, but of course these cannot be eliminated, and all we can do is to see that they are covered with some smooth material that can be easily washed or cleaned. A polished wooden floor, with mats instead of fixed carpets, is now easily cleaned by means of an electrical appliance, and the only troublesome part is the junction with the walls. Here a rounded skirting (see Fig. 6) should be provided in all houses and other buildings, as it has long been provided in hospitals. Of the three types illustrated, 'C', the most expensive, is the best, because it gives more protection to the paint or paper of the lower part of the wall than 'B' does. Rounded skirtings or 'fillets' of this kind are made of wood and also of glazed tile in all colours for use with tiled walls and floors for kitchens, lavatories, etc.

If you look round the room in which you are sitting as you read this

page you will soon be able to count how many of the horizontal ledges that it contains could be omitted without detriment to its appearance or utility. Begin with the cherished mantelpiece: is it really necessary? How long daily does it take your mother or your sister or your wife to dust that ledge and all its contents—the photographs and the invitation cards, the vases and clock and knick-knacks? Suppose it were to be replaced by a simple wooden strip round the tiled surround, or, as in my study where I am writing, by an oak moulding round white marble slips, would the loss not be counterbalanced by the gain? It is for the householder or the house-builder to decide. Then there is the picture-rail, a great harbourer of dirt; but that too can be simplified and there are certain drawbacks in its omission, unless you are prepared to go the whole hog, and omit all pictures too. All doors used to have moulded panels, but nowadays—as I have already observed—the fashion is for flush doors, and nothing better can be devised to save labour. Lastly there is the question of furniture, and there you can apply the same common-sense rule: avoid all possible horizontal ledges and inaccessible corners. As for vertical surfaces, vertical mouldings are easily dusted and in any case do not collect much dirt, but tapestried or 'flock' wall-papers should not be used in smoky towns, and all curtains should be of the simplest design and material, without trimmings and fringes. In the labour-saving house, and indeed in all public and commercial buildings nowadays, all metal work that is liable to tarnish and require constant cleaning should be avoided like the plague. Lastly, the considerable work involved for somebody, nowadays too often the housewife, in window-cleaning is avoidable by the modern fashion for using much larger sheets of glass than were popular a few years ago when the revived 'Georgian' method of small or smallish panes was all the rage. Up to very recent times writers on architecture maintained that small panes were necessary to give 'scale' to the exterior of the house, but this theory is not universally held to-day, and one imagines that many architects who have tried to paint the exterior woodwork of their houses during the war have felt a certain weakening of their cherished convictions. (The house in which I live, not a large one, has some 360 panes, as I realized only too vividly when I myself had to 'rub down and paint two coats' during 1941.)

Lastly must be mentioned an aspect of labour-saving and cleaning which, some readers may consider, lies right outside the scope of this book, because it has nothing to do with building. Strictly speaking, that is true; but it remains a fact that, even if the smoke nuisance can

be mitigated, even if every house is designed to avoid every opportunity for the lodgment of dirt, the housewife's irksome duties will remain heavy unless she can bring herself to approach the Japanese way of life by steeling herself against the accumulation in her rooms of superfluous portable articles. The Victorian pride of possessions which is made to appear so ridiculous in Lytton Strachey's life of the Great White Queen lingers on in most homes; things are kept 'in case they may come in useful,' and nearly every English house is littered with 'junk' which causes the châtelaine far more trouble than she realizes. More will be said on this topic in Chapter X (p. 65).

CHAPTER VIII

'HEAT, LIGHT AND SOUND'

I HAVE chosen the above hackneyed title for this chapter because it emphasizes the importance of science in the equipment of modern buildings. The warming and illumination of rooms, as well as the urgent need for reducing noise, have been among the most pressing of the manifold subjects dealt with at the Building Research Station near Watford since its establishment some twenty years ago; and it is in these respects that England tends to lag behind the practice of other highly civilized countries. It is commonly known that American visitors usually regard our way of keeping ourselves warm as primitive, if not barbarous; but we in our turn consider that they suffer in health by living perpetually in overheated rooms. English people cling obstinately to the old-fashioned open fireplace, considering the 'hearth' to be the centre of the home and deeming an electric fire or gas fire a poor substitute, while a radiator is reckoned even less attractive. My previous chapter must have made it clear that much of the smoke nuisance is due to the indiscriminate use of bituminous coal in open grates. Add to this the conclusion that everything must be done to reduce domestic labour in our new dwellings, and we have established a case for impartial consideration of the various modern forms of central heating.

It is by no means a novelty: numerous books on warming and ventilation appeared about a century ago, and though what we now call a 'radiator' was then described as 'a box containing a mass of pipes,' the principle of the circulation of hot water applied to domestic

warming was fully understood. The usual problem in any modern building is to warm all parts of it to a temperature which we in England prefer to be 60 degrees (though some other nations demand more), and to maintain that temperature, whatever changes may occur in atmospheric conditions outside. The last-named result is achieved nowadays by means of an uncanny robot known as the 'eupatheostat', which means, as all readers who know Greek will realize, 'the level of well-feeling', and represents an advance on the less human thermostat. The heating engineer has to provide in each room and corridor of a building sufficient radiating surfaces to warm its total cubical contents. Although electric wires are occasionally used, the normal method is the transmission of heat from a boiler through pipes to metal radiators exposed in the rooms or hidden in the plaster of the ceilings. Water not only has the useful property of circulating when it is heated, but also it absorbs and gives out, weight for weight, more heat than any other material. Thus it becomes a matter of simple arithmetic to work out the radiating surface required for each room, but it is much more difficult to design those surfaces so that they are effective, convenient, and architecturally satisfactory. In workshops, as in many other places, radiators standing on the ground are a nuisance: they occupy valuable working-space or get in the way of machinery (see p. 96). If they take the form of thin pipes buried in the plaster of the walls, they are ineffective. If they are buried in the ceiling-plaster they are unobtrusive and interfere with no sort of activity or furniture, but concentrate all the heat on your head, which is very bad for you. Their use also involves some risk of the plaster getting so dry that it comes away from its moorings and falls in large sheets, unless special precautions are taken. These buried pipes, in clusters, are known as 'panel heating.' On the whole, the best place for radiators is beneath the window sills, and here they are almost as unobtrusive as anywhere.

The more window area you have in any room, the more loss of heat will occur and therefore the greater must be the radiating surfaces provided. The material used for covering the walls is also a factor, and the heat losses in a panelled or even a plastered room are much less than in another with bare brick walls. There is a tremendous loss through all the crevices round doors and window casements.

To heat the water in a boiler you can make your choice from many kinds of fuel: coal, coke, oil, gas and electricity (the 'immersion' system). Generally speaking, coke is the most economical of these; but where only 'intermittent' heating is required (as *e.g.* in a day

school, a theatre, or the council chamber of a municipal building), it is sometimes found to be more effective and more economical to use some other type of fuel. It is, of course, quite possible, by means of carefully designed pipe circuits and stop-cocks, to shut off certain rooms, used only intermittently, from the main circuits; and this may lead to a great economy of fuel. At the present time 'fuel economy' has become a matter of national importance and the Government has made strenuous efforts to instruct large users of fuel, and the stokers who handle it, in methods of economy. Besides systems of heating by means of hot water and other systems—much too complicated to describe here—where steam is utilized in factories, etc., for the same purpose, there are various systems of combined heating and ventilating by means of warmed air, also rather beyond the scope of this little book. Generally speaking, it is desirable to install a separate plant for supplying hot water for washing and not to draw the supply from the heating pipes; but in small houses a combination of the two systems is inevitable, to save space and labour. Further references to domestic heating and hot-water supply will be made in subsequent chapters.

Lighting, more correctly described as 'illumination', is an increasingly important factor in modern building, and may be treated under two heads: natural lighting (or daylight illumination) and artificial lighting. Up to a few years ago the fashion for Gothic windows in such unsuitable places as hospitals, schools, libraries and public buildings resulted in absurdly inadequate lighting, to say nothing of ventilation. Recently the pendulum has swung so violently in the opposite direction that some buildings resemble glass-houses and an enormous bill for extra heating and window-cleaning has had to be faced. In a climate like ours, sunshine is desirable, and we do not design our houses as architects in the East do, to provide the maximum of shade; nevertheless, there is no sunshine for a large part of the year, and the heat losses through excessive areas of glass are tremendous, unless double windows are provided. In this respect common sense suggests moderation.

The amount of light which can reach any building depends not only upon its aspect but also upon obstructions such as trees and adjoining buildings. So far as the latter are concerned, the by-laws of the local authority have something to say, prescribing the height of buildings according to the width of the street in which they stand. Thus, the wider the street the higher may be the buildings. But supposing that the permissible height of the main front is 60 feet,

which would allow five or six storeys, it is generally permissible to allow further storeys to be erected if they are set back a sufficient distance from the main front to give as much light as is provided below; in other words, the added storeys must lie within an imaginary diagonal line projected from the ground level at the opposite side of the street. Similar rules may regulate the back and sides of the building if it stands upon an 'island' site. Thus, the upper part of a very high building (*e.g.* the London Transport headquarters over St. James's Park Station in London, see Frontispiece) may be stepped back in stages on all sides so that it resembles the Step Pyramid at Sakhara near Cairo or the Assyrian *ziggurat*. This necessity, coupled with the need to provide natural light in all parts of a large building, first led the architects of skyscrapers in New York to make these horizontal and vertical recesses a feature of their designs—a clear case of 'making a virtue of necessity'—and now English and European cities have followed suit. Old-fashioned critics make fun of the 'cardboard-box' architecture which results, but it is inevitable, and certainly some skilful architects have contrived to make a success of it.

Artificial lighting nowadays means electric light, which has become available in most parts of England since the network of the 'grid' has covered the greater portion of the country, but even thirty years ago it had not reached the locality where I live, only ten miles from Charing Cross. Its advantages over gas lighting are evident, and its efficiency increases every year. One tendency, for which the subtle propaganda of the Electric Lamp Manufacturers' Association is largely responsible, is to increase the 'candle power' or 'wattage' of all lamps. The increased intensity of illumination thus produced is supposed to reduce eye-strain, especially for certain occupations and situations; but the exigencies of war have induced the Government to press for lower candle-power everywhere as a contribution to fuel economy. Quite apart from mere intensity, however (nowadays measured accurately by a neat little portable instrument—the photometer), the science of lighting has advanced enormously; and we have learned that the distribution of lighting may be planned to enhance the architecture of a room as well as to save our sight.

The modern campaign for the suppression of noise, sponsored by the Anti-Noise League with its distinguished committee of medical men and others, has been necessitated by the increasing popularity and power of radio sets rather than by any other cause. Street noises, especially the grinding of gears, inevitable as traffic restarts

at every crossing, are really not much more blatant than when streets were paved with granite setts and all vehicles had iron-shod wheels. Young people practised scales and mangled Mendelssohn on the piano just as unmercifully when I was a boy as they do to-day, perhaps more so. But the noise of a powerful wireless set travels through floors, ceilings and even walls of thin, modern buildings, as well as through open windows. This particular trouble is found chiefly in flats, and will be discussed in Chapter XI (p. 69), but it also constitutes a nuisance in semi-detached or suburban houses (see p. 65). Other aspects of practical acoustics, a new science of which all young architects are expected to know something nowadays, will also receive attention in their proper place.

CHAPTER IX

COMMUNAL HOUSING

SOME years ago I wrote a book on house-building* in which I gave one chapter the catchpenny title 'Ready-made or made to measure' to distinguish between a house that has been built without regard to your particular tastes and requirements and another which an architect has designed specially for you. In the present volume I have decided to deal with the former group under two heads, 'Communal Housing' and 'Flats', and to describe the latter as 'Private Houses', which are never flats. This chapter is concerned chiefly with municipally provided houses, though houses of a similar type and size are in fact built in enormous numbers by speculative builders for profit. The provision of houses is accepted everywhere to-day as a duty of the State, and a vast programme is now being undertaken by the Government.

When any municipality or other local authority decides to embark upon a housing scheme, the first step is, naturally, to ascertain how many houses are needed to replace others condemned as insanitary by the medical officer, to accommodate newcomers to the area, and, under present conditions, to provide shelter for families rendered homeless by air raids. This may seem a very simple sum in arithmetic, but in fact it is a highly complicated problem, because much depends upon the standard adopted. When, for instance, is a house insanitary

* *How to Plan Your House* (English Universities Press, 1937).

and unfit for human habitation? Is it so hopelessly insanitary that it cannot be reconditioned at a less expense than is involved by complete replacement? (Something will be said about dealing with old buildings in Chapter XIX.) Then we come to standards of overcrowding, and there the Government, in the Housing Act of 1935, has given us a lead. The following table, taken from that Report, shows the maximum number of persons who should be allowed to sleep in houses containing various numbers of bedrooms. (Children under one year of age are ignored, and those between one and ten count as half a person! Rooms with an area less than 50 square feet do not count.)

1 room . .	2 persons	5 rooms or more .	10, with an additional 2 in respect of each room in excess of 5.
2 rooms . .	3 ,,		
3 ,, . .	5 ,,		
4 ,, . .	7½ ,,		

If you like to apply these figures to your own home, allowing a fair proportion of adults, children and babies, you will doubtless agree that the Government standard for overcrowding is not unduly generous or extravagant.

Another table prescribes the minimum size for bedrooms:—

110 sq. ft. or more	2 persons	70–90 sq. ft. .	1 person
90–110 ,, . .	1½ ,,	50–70 ,, .	½ ,,

This information supplies a useful guide where the size of rooms and the number of persons to be housed is already known, but gives little guidance to a municipality building for a given number of families of unknown size, age and sex, so here a good deal of guessing has to be done.

Somehow the authorities have to estimate these factors. To some extent the downward trend of the birth-rate is a pointer, indicating that smaller houses are required because families are smaller,* and the proportion of children to adults is less than it used to be. Many houses will have no children in them, and accommodation will also be required for single persons living alone, and for old people who should be housed in cottages or flats grouped round a communal restaurant. All these difficult decisions must be made by the municipal officers rather than by their architect, who is not primarily an expert in statistical sociology. Then somebody must take into consideration

* In Birmingham 60 per cent. of the families consist of 1–3 persons, reckoned as above.

the proportion of well-paid workers who will require something more than the minimum. The location of the houses, too, depends partly upon the location of industry in the neighbourhood, but that matter will be mentioned under the head of 'Town Planning' in Chapter XX. Out of all these studies and calculations there will eventually emerge some definite estimate of the number of two-bedroom and three-bedroom houses required, plus some provision for single persons, and possibly a few four-bedroom houses; but that is by no means the end of the matter. Are they to be cottages or flats; and, if cottages, are they to be built in pairs or triplets or quadruplets or even in terraces? Is the cooking to be done in the 'living-room' or in an adjoining scullery? Is a parlour a luxury or a necessity in the larger types of house?

These questions are real posers, because it is so difficult to ascertain the genuine views of the average tenant. If you take the opinions of the most enlightened highbrows among them you will certainly not obtain an average view; on the other hand, it would be absurd to accept unquestioningly the views of the most stupid. All scientific enquiry, such as house-to-house canvassing or 'mass observation', is liable to be resented in this highly independent country, but it is the only satisfactory way. One might assume, for instance, that dislike of 'strap-hanging' two hours or so a day would incline all workers in Greater London to favour flats in the centre rather than cottages on the perimeter. The highbrows, who talk and write so much, say they ought to do so, and take their cue from Central Europe as usual; but the result of investigations on a large scale in various cities shows a surprising partiality (usually 80 or 90 per cent.) in favour of cottages. The reason seems to be that most English people have a real love of a garden, however small, and for a house of their own rather than a tenement: nothing else will explain their readiness to waste so much time and energy in daily travel. If we are to be asked to continue to grow our own vegetables as far as possible, the advocates of suburban housing sites will have another argument available.

On the actual accommodation of the house the latest Government manual* is fairly definite. The largest bedroom should have an area of at least 150 square feet; the next one 120 square feet if a third one is not provided or if more than one and a half 'persons' are expected to sleep in it; the third may be 70–80 square feet for one person or 100 for one and a half persons. Downstairs the 'living-room' should be 180 square feet if there is no 'parlour', and rather less if there is,

* Ministry of Health: *Rural Housing Manual* (1939).

but a scullery should be provided in addition. The parlour, if provided, should have a minimum area of 160 square feet. Controversy still rages about the parlour question, as it did when I was designing 'Homes for Heroes', as they were then called, on a housing scheme in Surrey just after the last war. The anti-parlour faction, mostly highbrows, talk of aspidistras and antimacassars and china dogs and presents from Peacehaven, of suburban snobbery and wasted space; but the fact remains that it *is* rather nice to escape occasionally from the cooking and the babies. It is more important for women to decide how and where cooking is to be done, whether they would prefer a big living-room with a scullery and no parlour, or a parlour plus a working kitchen, or all three; and, above all, how many fires the family can afford to keep burning and whether the housewife wishes to attend to one, two or three. Various women's committees have recently issued reports on the homes they want in the future, but every single suggestion that I have seen involves added costs. The rooms must be bigger and higher, the walls thicker and sound-proof, there must be a parlour and a room for storage, there must be no dark corners or dangerous steps. Every house must have a refrigerator, basins (h. and c.) in every bedroom, electric points in every room, cupboards *ad lib.*, and even telephones! One can only assume that these ladies were serious in their demands, but they have completely neglected the financial aspect of things. The College of Physicians has also entered the lists, and its demands, though less sweeping than those of the housewives, mostly involve additional outlay: thus it recommends larger bedrooms than those stipulated in the Housing Manuals, a minimum of three bedrooms for all families of two or more persons except aged couples, and the sound-proofing of walls, etc., in flats. It remains to be seen what standard the Government will prescribe after the war: whether in fact the natural desire of large masses of the people for better conditions, on returning to normal occupations after a long and strenuous period in the service of their country, will be accepted as a reasonable burden by the community as a whole, or whether the period of extreme national poverty that some experts forecast as a corollary of the war will prevent the reforms that all men of goodwill ardently crave.

There are two other aspects of housing in general that must be mentioned. The first applies, however, mainly to rural districts, and is concerned with the materials used. As is pointed out in the *Rural Housing Manual* already quoted, some regard must be had to local tradition in this matter; thus in a 'stone district', *i.e.* a

locality where all the older buildings are of stone, the introduction of bright red brick walls and red tiled roofs is out of harmony with the prevailing architecture, so rough-casted walls and grey or green slated roofs are more appropriate. The other aspect applies particularly to large housing estates on the outskirts of our greater cities, and refers to the amenities of communal life. Many or most of the new inhabitants will have been transplanted from town streets and slums where a large measure of sociability has been the rule, not only the free-and-easy chatter of the housewives on their respective doorsteps, but the friendly intercourse of the churches, the pubs and the fried-fish shops. In many large new housing schemes, admirably planned otherwise, hundreds and even thousands of dwellings are often erected without any of these facilities for sociability, and their inhabitants feel utterly lost as their old ties have been severed: they are all strangers to one another. Sites may have been earmarked for churches and other institutional buildings, but are seldom occupied at once. The huge new town or settlement of Becontree on the eastern side of London, with 100,000 inhabitants, is usually cited as a recent case in point; and is also condemned as a 'one-class suburb.' Since it was laid out, a general feeling has arisen that 'community centres' should form part of the provision of every large new housing scheme. More will be said on this matter in my final chapter.

Details of construction and equipment for communal houses need not be elaborated here, and most of the hints given in my chapter on 'Private Houses' apply equally to them; but it may be remarked that the provision of constant hot water from a central source, as recommended by many reformers, is expensive and difficult to arrange for small blocks of two-storey dwellings on a large estate, though it is much more feasible in the case of communal flats.

CHAPTER X

PRIVATE HOUSES

As I explained at the beginning of the previous chapter, by a 'Private House' I mean one which has been specially designed by an architect to meet the expressed needs of a personal client; a house which is, in fact, 'made to measure' rather than 'ready made.' No matter how many standardized fittings and pre-fabricated units the architect

may utilize in the building of such a house, their choice, as well as the number and disposition of the rooms, will be made to suit the client's own taste. In the case of a middle-aged or elderly bachelor or spinster, or a childless married couple of advanced years, the problem is not complicated by a growing family; and they can instruct their architect to provide for all their whimsies, assuming that they have no interest in the ease or difficulty of selling the house after their deaths. If, on the other hand, they wish to be sure that it will maintain its value as an investment for the benefit of their heirs and assigns, then they must consider carefully whether all their whimsies are likely to be popular with the average potential occupant.

If the client or 'building owner' is, as so often happens, a middle-aged married man of forty or forty-five with a growing young family, he is faced with decisions of which he may not realize the importance at that age and stage. Suppose he provides a separate bedroom for each of his brood, how many years will it be before most or all of them will have left the parental nest, never to return? Then, perhaps before he and his wife are sixty, they find themselves saddled with a house far too big for them. If, however, they sell it and retire to a three-roomed flat, they soon realize that their children and grandchildren cannot be accommodated for a holiday or an emergency (*e.g.* during a war). The only solution of this insoluble problem is to look a long way ahead when you begin house-building, and to avoid freak features in planning.

Take, for example, the very vexed question of sitting-rooms. Among the more advanced or highbrow or cosmopolitan architects, mostly quite young, there is a violent prejudice against the Victorian 'drawing-room' and in favour of the single all-purpose lounge, usually very large. Is that tendency ephemeral, a mere passing fashion, or does it represent a definite change in our tastes? Throughout my life I have lived in houses where the drawing-room, so called, has been in daily use as the family sitting-room, while the dining-room has been used for meals. This dual use means an extra fire, extra cleaning, and extra lighting; but it has many obvious advantages which are worth preserving, if shortage of domestic help and the need for fuel economy are not the only or the over-riding considerations. It is undeniably true that, in a small or middle-sized house, one large 'lounge' is more imposing and attractive than two cramped sitting-rooms; but it allows of no privacy. One member of the household may love jazz, another may hate it. Children have 'prep.' to do at home; some fathers must work in the evenings. The radio

has made the single lounge insupportable for many perfectly reasonable people, and others again are so absurdly fastidious as to object to the smell of certain dishes (*e.g.* fried fish, onions, and cabbage) in the room where they rest or work. Above all, one gets the impression that the all-purpose lounge is favoured by childless folk of rather un-English antecedents, who never wish to be quiet or think, and whose chief occupations are talking and listening to the wireless. That impression may be slightly exaggerated; but one cannot be certain yet that the all-purpose lounge, with or without a 'dining recess', has come to stay. In houses where a lounge is provided in cold blood, the case for a small study adjoining it, but properly shut off from it by a solid wall or partition, is worth considering if there is any member of the household who is liable at any time to have to use his or her brain.

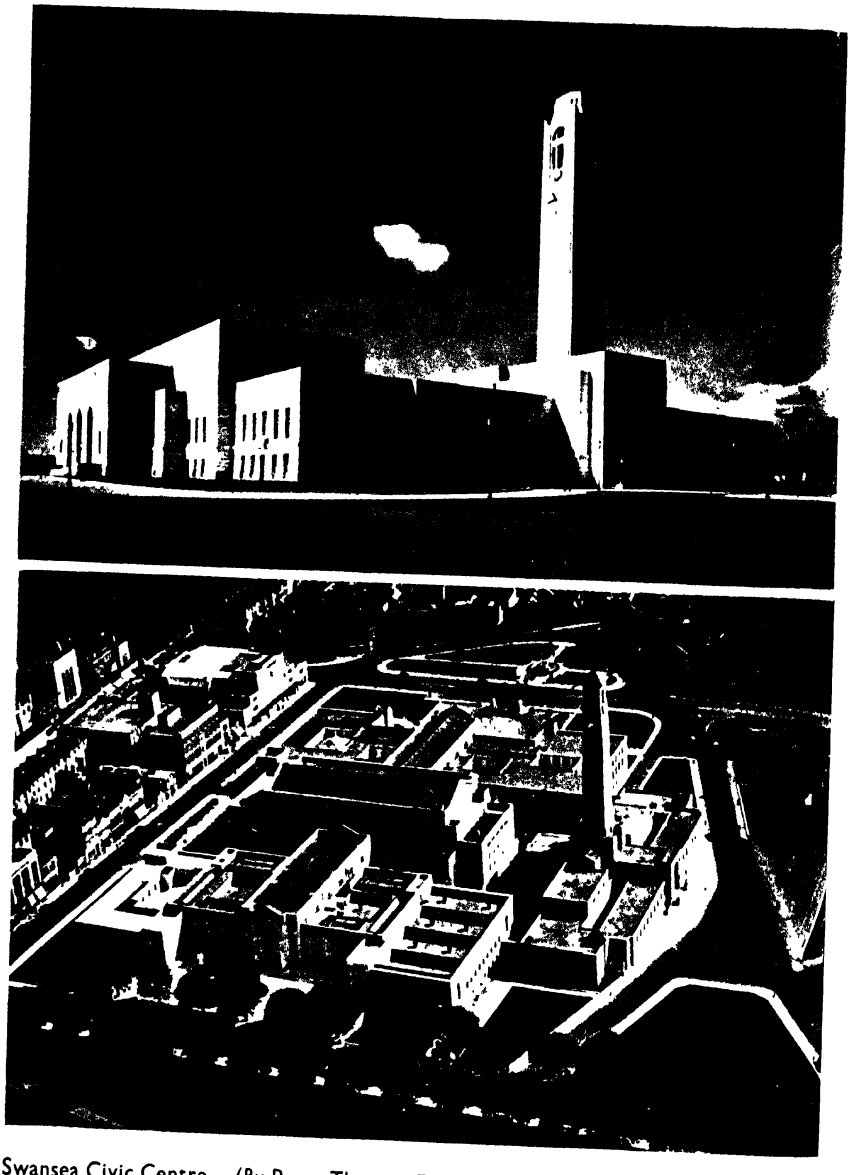
Another current tendency, which has much to recommend it, is to replace the spacious old-fashioned kitchen (where the servants used to sit and have their meals, besides working there) by a small but very compactly designed working kitchen, supplemented by a small sitting-room for the domestic staff, if, in fact, any maids are employed. This latter addition, however, does involve the provision of an extra fireplace; but as it will probably be a small gas fire or electric fire, used only intermittently, and as so much modern cooking is done on a gas cooker or electric cooker, there need be no increase in fuel consumption over the big old-fashioned coal-burning range. Against this must be reckoned the demand for constant hot water and hot baths, to an extent never imagined by our fathers, so that some form of boiler, probably burning coke, must be installed either in the small kitchen or else in a still smaller annexe. In a house of limited size, the same boiler may be made to heat a few radiators, best placed in the hall and on the landing; if so, provision should be made to shut all the heating system off from the hot-water supply system in the summer when only the latter will be required. In large houses there should be separate boilers and pipe circuits for heating and for hot-water supply. Gas fires are slightly less expensive in use than electric fires, but either are suitable for a study or in bedrooms where only intermittent use is required. The good old English coal fire remains in favour among most people, who are disinclined to gather round a radiator, and is still retained as a rule in the principal sitting-room or lounge; moreover, many medical authorities preach its virtues as the healthiest method of keeping an ordinary room well ventilated.

Upstairs the modernists have not yet introduced the communal

Above : Leeds University : the Brotherton Library. (*By* Lanchester and Lodge, FF.R.I.B.A.)

Below : Royal Institute of British Architects, Library. (*By* G. G. Wornum, F.R.I.B.A.)

PLATE 15



Swansea Civic Centre. (*By* Percy Thomas, F.R.I.B.A.)
Southampton Civic Centre. (*By* E. Berry Webber, A.R.I.B.A.)

Photo: Southern Newspapers, Ltd

bedroom, but families are getting smaller and smaller, with a consequent reduction in the number of bedrooms provided in the average house, counterbalanced by an extra bathroom or two. The installation of hot and cold water to wash-basins in all or most of the bedrooms is another modern way of reducing domestic labour; it costs a good deal in the first instance, and may be difficult to contrive in every bedroom, but the outlay is balanced by a saving of labour and thus, presumably, of servants' wages. The provision of built-in cupboards in bedrooms, of fixed fitments in the kitchen, and of fixed bookcases (with adjustable shelves) in the study also costs a good deal at the outset, but leads to some little saving of labour in cleaning, and appreciably lessens the terrors of a 'move'. Many a smart little modern house has been ruined by the importation of an enormous Victorian mahogany wardrobe, dragged and manœuvred up its creaking stairs by sweating removal-men to block half the available bedroom space; and many an architect has had to alter a compact efficient plan to make room for one of these cumbersome period pieces, which its owner would not consign to the salvage dump, its only appropriate home. If you want a really efficient modern house you must let some of these ancient monuments go.

Various hints on saving domestic labour entailed in cleaning rooms and furniture have already been given in Chapter VII: they are all based upon common sense and experience. Much depends upon the housewife's own choice: if she persists in collecting heaps of superfluous furniture and knick-knacks, in buying hangings and upholstery that collect dust, in asking for metal fittings that require constant polishing, she has only herself to blame if she is overworked. But the architect can do a good deal to help her, and generally he is sufficiently versed in domestic 'chores' in his own home nowadays to be able to sympathize with her point of view. The elimination of excessive or unpleasant noise in a detached house is obviously simpler than in a block of communal cottages or flats, because the noises to be reduced are mainly or entirely home-made. The authority of the Victorian paterfamilias is, however, supposed to be as extinct as the dodo; and if he wishes to escape at times from the hurly-burly of his family at play, or from the more aggressive efforts of the B.B.C. in full cry, he can only do so by spending more money: either in making partition walls thicker than they need otherwise be, or in fixing sundry insulating devices and materials. By laying thick cork lino over the whole of a bedroom floor, and a thick carpet above that, much of its liability to transmit wireless noise from below is reduced

but, on the other hand, labour-saving demands loose mats on a polished wood floor with a wide bare 'surround', two incompatible methods. Some minor items of equipment which should never be overlooked by the architect in planning a family house are the pram and the dustbin, both of which are liable to destroy his effects—internal and external respectively—unless provision is made for their place from the outset. It may also be added that the storage of fuel is not so simple as it looks: most modern small houses burn two or three kinds of coal and coke, plus a certain amount of logs, so that the coal-shed or coal-bunker needs to be subdivided accordingly. Much more detailed hints on the planning and equipment of the house than can be given here are contained in my book already mentioned.

As for its general design and appearance, that will be determined by the taste of the client and his architect, preferably working in complete harmony! If the client should *insist* upon having sash windows, or casement windows, or windows with large unbroken areas of glass, that will inevitably influence the architect's general design. So also the client might insist upon a red brick exterior and a tiled sloping roof, or an all-white concrete house with a flat roof like Mr. Frankenstein's in Hampstead; or an olde-worlde Tudor cottage exactly like the example his wife saw at Olympia in one of those exhibitions that provide architects with so many headaches. Probably most prospective builders of houses approach their architect with some prototype in mind, or at any rate with some preconceived ideas. Up to a point this is all to the good: the trouble usually arises when the client has acquired views which are mutually contradictory, or impracticable on grounds of structure or cost; but even in matters of taste the architect should be given a reasonably free hand; for, after all, that is part of his job for which he was trained and for which he is being paid.

The two houses illustrated on Plate 6 are 'traditional' in appearance though up-to-date in their internal arrangements; whereas the example illustrated on Plate 7 is a complete breakaway from that tradition and represents the more cosmopolitan or international ideas of the advanced 'modernists'. The house at Kingswood (6*a*) is consciously picturesque with its steep-pitched roof and bold gable, but is nevertheless a good example of ordered design, and has no meretricious ornament about it. On the garden front, shown here, the windows reading from left to right are those of the large 'living-room' or lounge, the hall (French windows), the dining-room, and

finally a small window of a tiny study for the architect's own use. Upstairs there are three bedrooms. The walls are of eleven-inch hollow brickwork, lime-whited externally, and the roof is of apple-green glazed pantiles.

The house near Leatherhead (*6b*) is also very English and traditional in character, with a steep tiled roof. On the entrance front is a gable, not visible here on the garden front illustrated, where the ground-floor windows are respectively those of the kitchen, dining-room, and large 'sitting-room'. On the first floor there are three bedrooms facing the garden, and a fourth on the other side; while there is also a large room in the roof. The walls are of eleven-inch hollow brickwork, faced with sand-faced 'multi-colour' bricks.

The house in Sussex (Plate 7) was planned as a week-end residence for a Brighton doctor and his family; it stands on the top of a hill with extensive views. It is square on plan and half of the ground floor is occupied by a spacious 'lounge' and dining-recess, the former being lit by a huge triangular 'bay' window. On the left of this picture is the large garage; and upstairs there are four bedrooms, with a verandah on the roof. The other view shows the living-room. The walls are of concrete, only four inches thick, but three concrete stanchions inside the house carry much of the weight.

CHAPTER XI

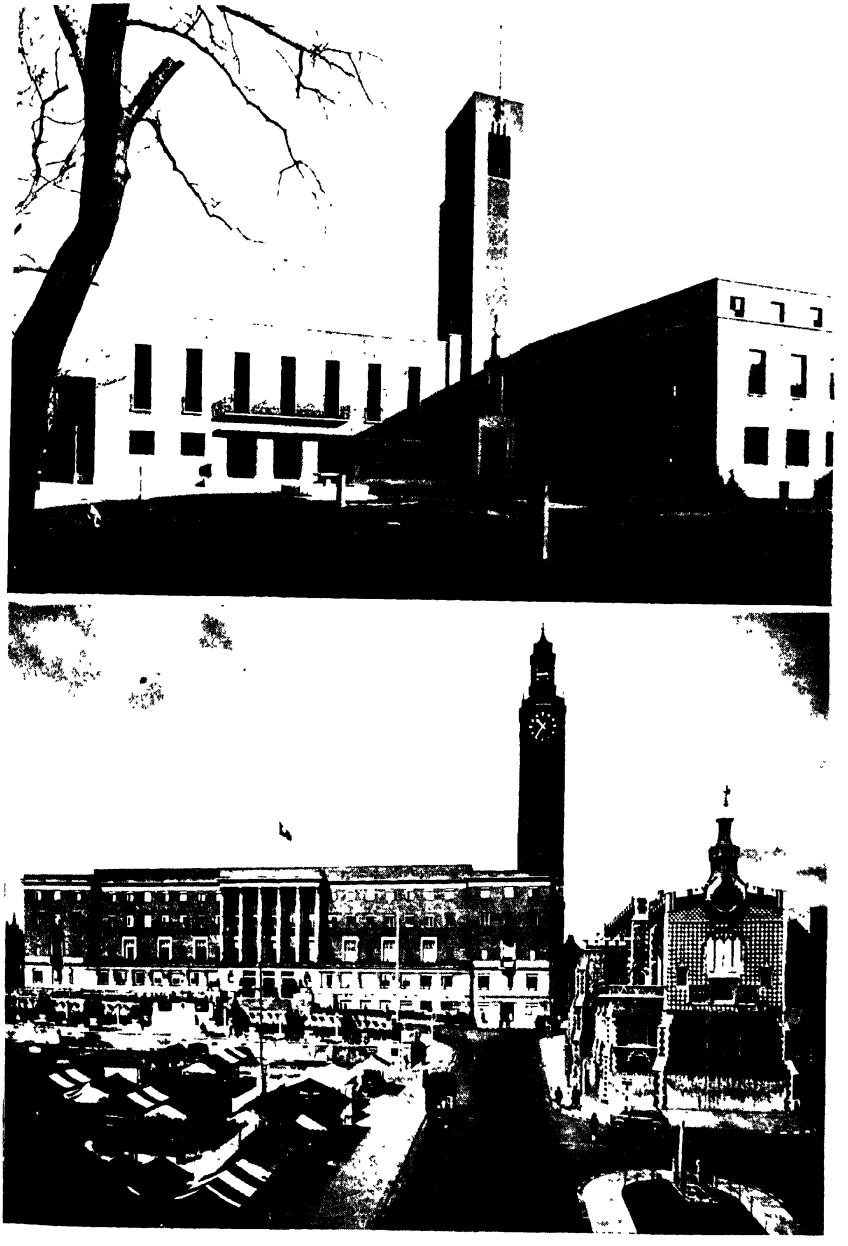
FLATS

TENEMENT houses or apartment houses, commonly called 'flats' because they consist of dwellings each on one floor, but piled one above the other in layers, are quite certain to be built in large numbers during the great building boom that is coming, and in all Continental countries they constitute the normal type of urban dwelling, far more popular than they have been hitherto in England. As already remarked, most Englishmen prefer to have a small garden of their own and to have a small house they call their own, even if they do not actually own it! To obtain this boon they are prepared to make long uncomfortable journeys daily to and from their work. Nevertheless, there are many people whose work is of such a nature that they must live near it, whether they wish to do so or not; and for them the only solution is a tall block of flats near their place of employment. There

is also a minority of people who really like living in the middle of towns: they feel that there they are at the living heart of things, and some of them regard the suburbs as the home of Philistinism, snobbery and unimaginative torpor.

Flats are of two kinds: those which are merely old-fashioned houses 'converted' into flats, and those which have been specifically designed for their purpose. Although great ingenuity is often displayed in the former type, they are always more or less unsatisfactory; and very often they are disgracefully inadequate. Most large towns have an industrial and commercial heart or kernel, in which the principal shops, offices, and public buildings are situated. It is usually old, often congested and badly planned. Round this kernel lies a belt of houses built during the nineteenth century. Formerly they were surrounded by green fields; now they have been encircled by a ring of detached and semi-detached villas erected during the last fifty years. It is the nineteenth-century houses, for the most part, which are now occupied as tenements. Generally they are built in terraces or squares or crescents, with three or four storeys between the attic and the basement. The kitchens are below ground, the dining-room on the ground floor, the drawing-room on the first floor, and the bedrooms above. They were all built for middle-class people or wealthy people, on the assumption that servants would be available to carry coals and hot water upstairs and to sleep in any dark hole allotted to them. The single bathroom was placed on the first or second floor, w.c.'s on two or three floors, the sink in the basement. They were never intended for occupation by more than one family.

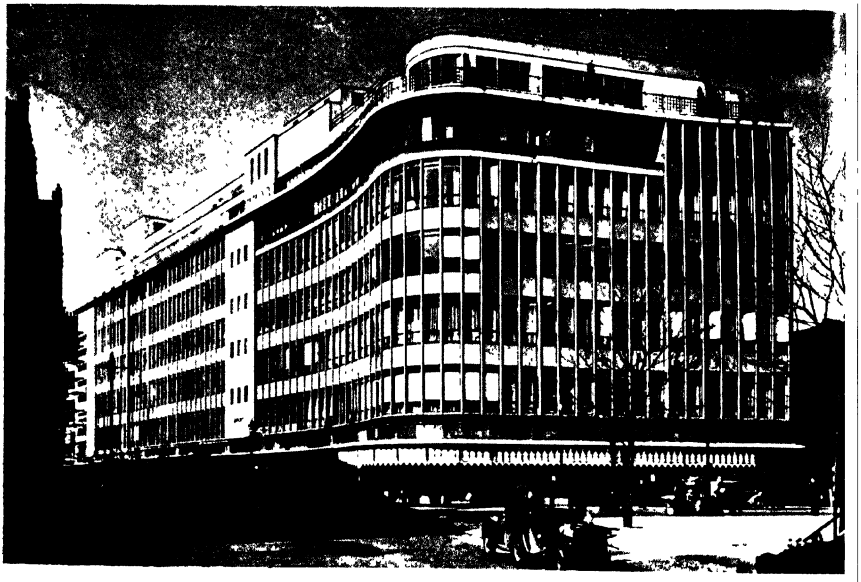
Now imagine the problem involved by settling five separate families on the five floors of such a house, whether it be in Bow, E.3, or Belgravia, S.W.1. First of all, each 'flat' or tenement must be shut off from the staircase and have its own 'front door': that problem alone is most difficult. Next, each floor must be cut up into separate rooms to comply approximately with the overcrowding standard mentioned on p. 59 of this book. Then the following items must be installed: a cooker, or range providing hot water, a sink, a w.c., and a bath, all properly ventilated and shut off from the living-rooms. You do not need much technical knowledge to realize that such a conversion is not only extremely difficult but also very costly, and that the rent of the flat so obtained will be prohibitively high for the small wage-earner. It therefore follows that it is seldom done, and hundreds of thousands of people, in London alone, are living in squalor in the bedrooms and sitting-rooms of middle-class houses, with-



Above : Hornsey Town Hall. (*By* R. H. Uren, A.R.I.B.A.) *Photo : Bedford, Lemere & Co.*

Below : Norwich City Hall. (*By* C. H. James, A.R.A., F.R.I.B.A., and Rowland Pierce,

PLATE 17



Above : Messrs. Peter Jones's Store, Sloane Square, London. (*By* Slater and Moberly, FF.R.I.B.A., in collaboration with Prof. C. H. Reilly, F.R.I.B.A., and Wm. Crabtree.)
Photo: S. W. Newbery

Below : Messrs. John Barnes's Store, Finchley Road, Hampstead. (By T. P. Bennett)

out proper facilities for cooking and washing-up, and without separate bathrooms and w.c.'s. These are indeed 'slums', and there is a belt of them, at least a mile wide, all round inner London, as in most other cities on a smaller scale. Sooner or later they will all have to be pulled down and replaced by modern flats standing in spacious gardens. This forecast does not apply only to the seedier neighbourhoods, but also to such formerly aristocratic neighbourhoods as Belgravia, whose rows of mansions, deserted by ducal or wealthy owners during the 'blitz', will never be occupied again because of the dearth of domestic servants; which, in my opinion, is likely to continue.

In the design of modern flats, for persons of any class, the chief problems arise in connection with access, sound-proofing, and lighting, all of which are interrelated. Problems of access include the arrangement of stairs and lifts so that residents, visitors, tradesmen, coal-heavers, postmen and refuse removers may be able to reach each flat easily, without an undue waste of space in corridors and staircases. These are all matters of planning for the architect to decide, and vary according to the rental. Thus, in 'luxury flats', for which fantastic rents are charged and obtained, separate entrances for residents and tradesmen are provided for each flat, there is a liveried attendant in the hall downstairs, and a lift to the upper floors. In the cheaper flats lifts are considered impracticable and only one entrance to each flat is provided; but chutes for refuse are now often fixed, and in the huge new block at Quarry Hill in the centre of Leeds (Plate 4), one of the most remarkable of recent municipal enterprises in England, a French system of disposal has been installed, all the refuse from the chutes being burnt at a central destructor attached to the great block of dwellings. In all such large communal buildings it is possible—at a price—to provide central heating and constant hot-water supply.

The sound-proofing of modern flats has become a vital matter since the 'improvement' of radio sets, as already explained in Chapter VIII of this book, for obviously it is more difficult in such buildings than in detached or even semi-detached houses. Where every inch of floor space is so valuable, the tendency is to make partitions thin; moreover, the whole construction is hard and resonant, and sounds travel easily through walls and floors, as well as through open windows where windows of one flat lie opposite to another not far away. Sound-proofing is costly, consisting either in the use of insulating materials or in the thickening of walls and partitions: it is therefore out of the question in cheap buildings. Something can be done by a

skilful planner, *e.g.* by placing a kitchen or bathroom next to rooms where a wireless set is likely to be installed; by arranging flats so that windows do not face each other directly at a short distance apart; and by providing wide balconies—which incidentally are most desirable as places where babies may be aired in the sunshine—with partitions which reduce the passage of sound from the windows of one flat to another. Equal skill is required to ensure that each flat gets as much unobstructed daylight as possible in its habitable rooms and that the larder faces north or north-east. There is no type of modern building where so much ingenuity and knowledge is required on the architect's part.

Four examples of modern London flats are illustrated in this book on Plates 4, 5, and 17. Dorset House, in the Marylebone Road, was completed a few years before the war by an architect who has specialized in this particularly complex type of building, and has devoted close attention to the problems of privacy and insulation against noise already described in the present chapter. It is a most ingenious and complicated arrangement of rooms in flats of a high rental value but of great variety and size, and the general external effect is most successful. The same architect designed the imposing store for Messrs. John Barnes in the Finchley Road, Hampstead, illustrated on Plate 17, where the upper floors consist of residential flats ranging in size from a single bed-sitting room with kitchenette and bathroom up to flats including five rooms in addition to kitchen and bathroom. A remarkable feature in this block is the provision of servants' bedrooms, which can be hired by tenants, outside the walls of their own flats.

On Plate 5 are illustrated two more designs for flats by another firm of architects who have specialized in this important branch of modern building. Both these buildings have an unusual and meritorious feature, an absence of internal courts; and both are faced with brickwork externally. The block in Charterhouse Square stands firm amidst scenes of desolation wrought by bombing, a testimonial to the rigidity and fireproof qualities of the modern framed structure though its walls are only 9 inches thick. Blocks of residential flats are scarce in the City of London. This example contains 126 separate flats on ten floors above the basement. The accommodation varies from one to three rooms in each flat, plus kitchen and bathroom. Besides two high-speed passenger lifts and a service-lift, there is also a refuse-lift. An ingenious feature of the design is that meters can be tested, food and parcels deposited in lockers, and refuse cleared—all

from outside without entering the flats. The basement is occupied by a large restaurant, cocktail bar, club room, about twenty garages, and two squash-courts with changing-rooms.

The fine block known as Cholmeley Lodge stands on Highgate Hill overlooking Waterlow Park and London. To make the most of this view, all the principal rooms face south-west, the building having a curved plan, and all the sanitary arrangements and pipes are concentrated at the back. There are six floors of 'medium-priced luxury flats' with rents ranging (pre-war) from £140 to £255 a year. Each flat has three, four, or five rooms besides kitchen and bathroom. The living-rooms measure 20 feet by 18 feet, an unusually generous size. The equipment comprises all the latest ideas in plumbing, heating, lighting, kitchen fitments and cupboards. The skilful treatment of the balconies deserves attention.

CHAPTER XII

CATHEDRALS AND CHURCHES

MOST English people take it for granted that all new churches should be Gothic of a sort, and that anything else—including presumably St. Paul's Cathedral and Wren's surviving City churches—is slightly pagan and certainly un-English. On the other hand, the *intelligentsia* among young English architects, deriving their ideas mainly—as I have pointed out in previous chapters—from Central Europe just before the war, have a perfect loathing for everything Gothic and antiquarian, while the English tradition—for obvious reasons—does not influence their mentors from overseas. Thus while the 'Old Guard' condemns many of the new churches as resembling power stations, the 'Youth Movement' jeers at its elders for reproducing obsolete ecclesiastical forms and pseudo-Gothic carving. The whole question, as I hope to prove, is largely a matter of taste and cannot be solved on 'functional' grounds; however, we may well begin by applying functional tests.

What functions, exactly, are common to churches of all denominations, from the Roman Catholic cathedral to the lowliest little Quaker meeting-house? Surely one only: the worship of God according to the Christian faith. Apart from this, there are some features (*e.g.* congregational music) common to several denominations but

not shared by all. In an earlier chapter I showed how the merely functional test fails to function perfectly when you apply it to a railway station; applied to a church it seems to be even more futile. Accepting the axiom that a church in England is a place for Christian worship, how does functionalism tell us what it ought to look like; and if it does tell us that, who is to say whether it is right? Let us make a simpler approach and assume that an architect has been commissioned to design a new church to seat five hundred persons, in a new suburb where no question of harmonizing with Cotswold cottages or Kentish oast-houses can arise. The prime function of that building, regarded from a purely utilitarian standpoint, is to provide shelter for a maximum audience of five hundred—probably at a prescribed cost, to keep the temperature up to about 60 degrees in winter and comfortably cool in summer, to arrange means of entrance and exit complying with local by-laws, and to install an efficient lighting system which is free from glare and can be controlled by master switches at a convenient point. So far, so good: the technical information required is readily available.

But as soon as he comes to the acoustics of the building, the architect is faced with the need to make fundamental decisions about the shape of the church involving questions of taste as well as of function. His choice will be determined in part by the denomination of his clerical employers, for whereas in the Roman Catholic and Anglican churches the chief emphasis is assigned to the altar and the ceremonies surrounding it, in the Free Churches the pulpit takes the first place. But as both these groups set a high value on singing of one kind or another, and as the former ignore sermons no more than the Free Churches disregard the communion service, the difference in ideal acoustic conditions between their several requirements is only about 20 per cent. in the length of reverberation required. The almost new science of acoustics has now reached the stage where calculations of this kind can easily be made; in making them, regard is always had to the probable or ideal or 'mean' number of people in the church, for human bodies and clothing form good sound absorbents.

The most satisfactory type of church acoustically—that is, for both music and preaching—has a very simple plan without transepts and preferably without aisles, and with a wooden roof. Domes, stone vaults, barrel-ceilings and lofty spaces over the 'crossing' all interfere with ideal acoustic conditions. The organ should be under the main roof, not stowed away in an organ chamber or recess. An ex-

cellent position is in a gallery at the west end: the position for which Bach's noble music was written and where it was performed in Leipzig. There are examples of this method in many City churches in London. In churches, old or new, where reverberation is found to be excessive, large sheets of sound-absorbing material should be fixed to the west wall, the nave ceiling, the transept ends, or elsewhere as an expert may direct.

The position of the pulpit at one side of the chancel arch is common in Anglican and Roman Catholic churches, and lately has been extensively adopted by the Free Churches, who once followed the Early Christian practice of a pulpit behind the communion table. This latter method is feasible, however, only with an apse or very shallow chancel, or in a 'hall church', without a chancel and planned for preaching, like the Dominican 'hall churches' of the Middle Ages. The lop-sided effect of the pulpit at the side of the chancel arch may be avoided, and dignity preserved, by the substitution of twin *ambones*, raised only a few steps above floor level (Plate 9): this Early Christian precedent is justified by historical tradition.

Beyond this limit the functionalist can go no farther. Just as a scientist can tell you how many ounces of calcium, carbon, iron and water your body contains, but cannot explain the life-force or the human spirit, which is what really matters, so the functionalist cannot tell you what a church should look like inside or out, or how it should be designed to produce an atmosphere conducive to devotional worship. He demands only that all its forms shall be new, that nothing medieval shall be reproduced; so his views are negative rather than specifically helpful.

The idea of a devotional atmosphere varies with each worshipper's personal temperament. Thus, at one extreme, the Quaker demands extreme simplicity of surroundings to match the intellectual and mystical austerity of his service, where there is no professional priesthood, no music and no liturgy. The Congregationalist favours a thoughtful sermon, extempore prayers by the minister, and good four-part choral singing of psalms and hymns; more than three centuries of tradition predisposes him against symbolism and leads him to prefer a black Geneva gown to elaborate vestments. The Roman Catholic lays great stress on ritual, imagery, tradition, mystery, symbolism, vestments, Gregorian plain-song, ceremonies at the altar, and a formal liturgy. The Church of England, with its acknowledged genius for compromise, accepts almost anything between the extremes just described, and provides all things for all men.

Our old Gothic churches were planned before the Reformation, primarily for the celebration of the Mass, not for preaching or congregational singing; and therefore their traditional arrangements are much more suitable for Roman Catholic and Anglo-Catholic than for Protestant worship. The more Protestant the service, the less appropriate is the old plan. That is the plain truth. When Wren was faced with the task of designing a large number of new City churches to replace those which perished in the Great Fire of 1666, he made no bones about abandoning tradition, and planned them for Protestant worship in which sermons and hymn-singing took the first place. His report on this question is worth reading. Several of his new churches were provided with galleries to accommodate large congregations, and they were entirely modern and practical in all their arrangements. With the exception of the remarkable little Congregational chapel at Horningsham in Wiltshire (1566), most of the early Nonconformist meeting-houses date from Wren's time, and they were planned for Protestant worship, completely disregarding medieval tradition. It was not until the early nineteenth century that the Church of England reverted to Gothic architecture, a tendency stimulated by the Oxford Movement; and somewhat later that the Free Churches followed suit; often with lamentable results, as the elaborate type of building which they now attempted so thoughtlessly was beyond their means as well as unsuited to their form of worship. The Quakers have been more intelligent in their realization that Gothic was not for them. Other forms of architectural expression are available for English Protestants of all kinds, without any need for accepting the latest exotic fashions from Berlin, Vienna, or Brnzl, as some modernists apparently wish; but, whatever we do, let it be sound, straightforward, honest building; not cheap reproductions.

There is no lack of elaboration in the magnificent Anglican cathedral still rising at Liverpool (Fig. 1, p. 32). The familiar story of its genesis is worth re-telling. The competition in 1903 for its design attracted one hundred architects, and the successful competitor, Giles Gilbert Scott, was then only twenty-two years of age. Grandson of a famous architect, son of another no less competent, he was the third great church builder in succession named G. G. Scott, and his fine church at Liverpool surpasses in size and grandeur all the others that his father and grandfather erected. Built of dark red sandstone, it rises prominently above the city, and its mighty tower (323 feet high) dominates the view as travellers by sea steam up the Mersey. For those who like big figures, it may be added that its total length

externally will be 619 feet, its internal width 87 feet, and its estimated cost £2,000,000. It is Gothic, but nothing like it was ever built in the Middle Ages, and its noble interior creates a feeling of devotion which is a testimony to the original genius of its designer. Except the nave, it is nearly finished; but one cannot yet judge what will be the ultimate effect when the late Sir Edwin Lutyens' huge Roman Catholic cathedral, in an Italian style with a dome, rises on a site not far away. The contrast in design is doubtless a good thing, but it remains to

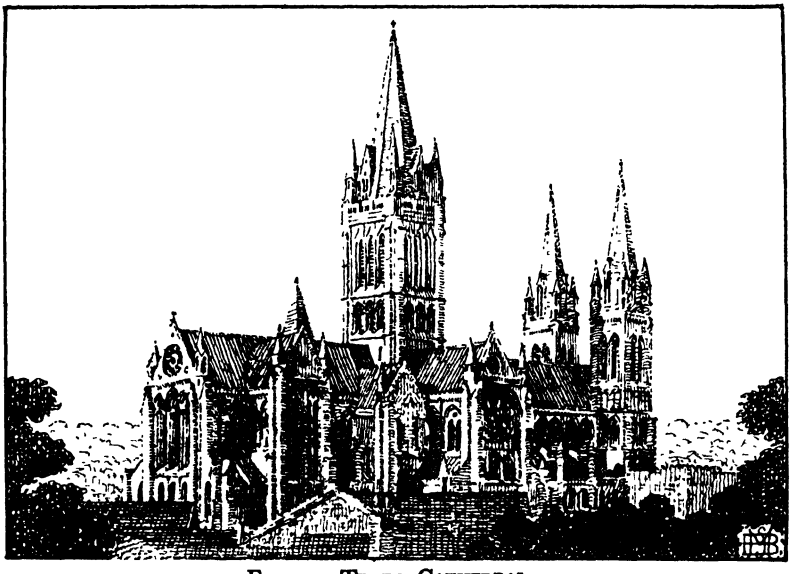


FIG 7.—TRURO CATHEDRAL

be seen whether the two enormous churches will settle down happily together in the landscape.

Another entirely new Anglican cathedral, designed by Mr. Edward Maufe, who was successful in a competition held in 1930–31, is springing from the bare top of a prominent hill just outside the town of Guildford (Plate 8). The foundation stone was laid six years later, but the superstructure was not commenced till 1938. It was intended to build the choir, transepts, and 'crossing' under the tower as a first instalment, to be completed at a cost of about £84,000, but the war intervened, and the great block remains stark and unfinished. The ultimate estimated cost is £250,000, the total external length will be 365 feet, there is to be a splendid central tower, and the church is faced with bricks made from clay dug upon the site. The

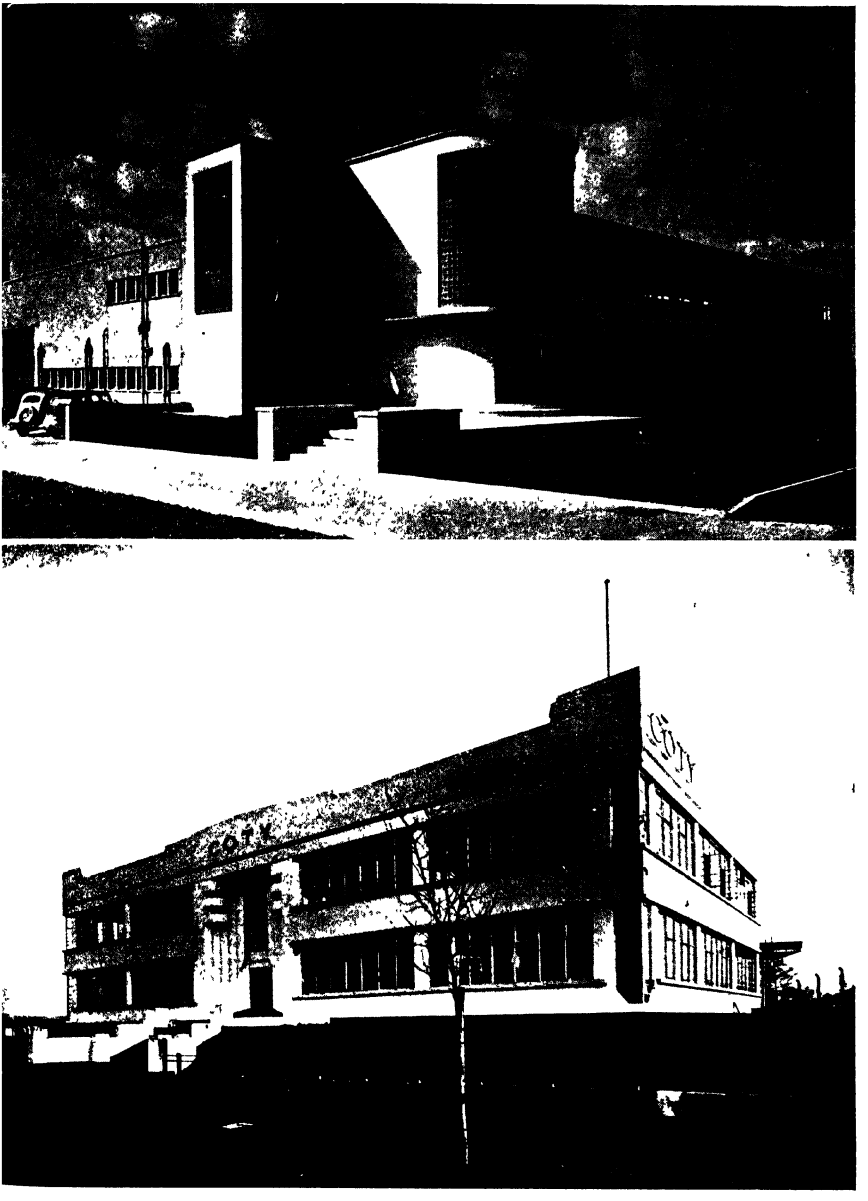
style is modernized Gothic of a rather severe kind, but very English and attractive: it may be compared with Truro Cathedral (Fig. 7), begun nearly fifty years earlier, which is a fine example of orthodox Gothic and wonderful craftsmanship, but is quite out of harmony with the Cornish tradition and is far more French than English. It reminds me of a line that Tennyson once wrote about another topic: 'Faultily faultless, icily regular, splendidly null.' At Portsmouth Sir Charles Nicholson has most skilfully extended the rather hetero-

FIG. 8.—BUCKFAST ABBEY

geneous parish church to form a cathedral, adopting a style which is neither Gothic nor Classic nor Byzantine. Similar enlargements of old parish churches which have become cathedrals are projected at Bradford, Chelmsford, and Sheffield.

Sir Giles Scott's design for the rebuilding of Coventry Cathedral, after its partial destruction during the recent war, provided for the retention of the fine spired tower and the apse, but had a central altar under the 'crossing', a chapel for the joint use of the Anglican and Free Churches, and a group of buildings to be known as the 'Christian Centre'—also for joint use.

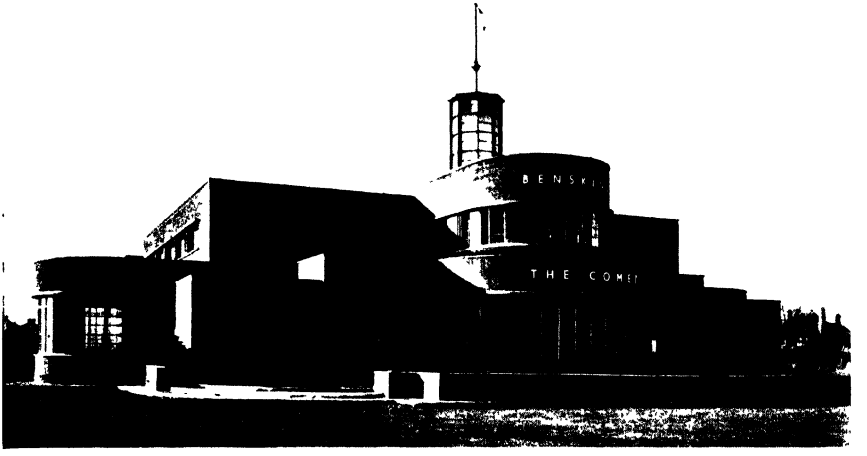
Another frankly Gothic church of large size which has attracted much attention recently is the great Benedictine abbey at Buckfast in



Above : Factory at Slough. (*By* Sir John Brown and Henson, FF.R.I.B.A.)
Below : Coty Factory on the Great West Road. (*By* Wallis Gilbert and Partners, FF.R.I.B.A.)

Photo: Architect and Building News

PLATE 19



Above : The Comet Hotel, New Hatfield.
Below : The Bull and Butcher Hotel, Whetstone. (*Both by* E. B. Musman, F.R.I.B.A.)

Photos : Architects' Journal

Devon (see Fig. 8), built between 1906 and 1932 on the foundations of a medieval monastery. This abbey has been mistakenly regarded by sentimental visitors as the unaided work of a handful of devoted monks, labouring without the advice of an architect or any modern nonsense of that sort! It is true that its fine masonry was erected by the monks, and that in itself was a remarkable achievement; but they had recourse to artist-craftsmen from outside for its most ornate features—the font, the altar, the huge corona for lights, and the great bronze candelabra—and the building was in fact designed and planned for them in the ordinary way of business by a perfectly competent F.R.I.B.A.

As examples of smaller churches, more modern in treatment but definitely English in character, and very different from the eccentric designs of some of our cosmopolitan modernists, I illustrate here the charming new church at Weston Green, near Thames Ditton, in Surrey (Plate 9), and the new Methodist church at Timperley in Cheshire (Plate 10). The former accommodates three hundred and twenty persons and cost £8,000 just before the war. It stands on an attractive site facing a common, and a vicarage will ultimately form part of the scheme. The entrance is at the *east* end, an unusual feature in an Anglican church. The choir is placed in a gallery over the entrance, and in the tower is a study for the vicar—another unusual feature. The walls are of brick covered externally with a stone wash, the tiles are stone-coloured, and the interior of the pine roof is left its natural colour. The simplicity and tastefulness of the whole design, internally and externally, is obvious; and the architect has achieved internal symmetry by the use of twin 'pulpits' or *ambones* or reading-desks in the way I have already suggested.

The Methodist church illustrated in Plate 10 is the result of a competition won by two young architects, and gives accommodation for four hundred persons. A Sunday school will ultimately be added. It is only one example, out of many of its kind, of a welcome tendency among architects to devise a style of architecture for the Free Churches which will be distinctive, and will avoid blind copyism of inappropriate medieval examples, without altogether abandoning the traditional English idea of the form which a church building should take. Here there is the simplicity of design and honesty of construction which should characterize a Puritan meeting-house, yet it seems to me that here, too, a devotional atmosphere has been created. A harmonious colour scheme has been achieved, and the starkly severe woodwork is of wax-polished oak. The large grille conceals the organ-pipes.

CHAPTER XIII

SCHOOLS AND COLLEGES

WHATEVER tolerance of Gothic for churches I may have seemed to show in the previous chapter, I am convinced that the thrall of medieval Oxford and Cambridge must soon be wholly abandoned for educational buildings of all kinds. Here a functional test *is* permissible, and the mock Tudor college breaks down every time when faced with modern demands, as indeed the two old universities have realized of late to their own credit and benefit. It began with water-closets, then a demand for bathrooms followed, and next a whole series of laboratories and what-not, of which even the purpose was obscure to the scandalized older dons, who found it difficult at first to reconcile owls and ivy with relativity and bio-chemistry, to say nothing of engineering. Die-hards still remain in both universities, and not all the grudgingly admitted essays in architectural modernism have proved successful; but some of them (*e.g.* Mr. Easton's charming new laboratories at Cambridge) do achieve their purpose without affronting the *genius loci*, and they are far more appropriate than Sir Thomas Jackson's ponderous science buildings of various kinds, erected two generations ago, which attempted to maintain the 'Jacobean' tradition. The medieval colleges are undeniably beautiful, attractive to all sensitive people as well as to their fortunate *alumni*; but there is something ridiculous in the elaborate and costly reproductions of their Tudor features round the *campus* of so many modern American universities.

Nevertheless, the imposing new tower of Bristol University, as well as the great hall behind it and Wills Hall at Clifton not far away, are closely copied from late Oxford Gothic and admirably built in stone regardless of cost. The other small modern university, at Reading, has displayed more originality in its architecture, which is mainly of red brick. Alfred Waterhouse designed new buildings for three large universities founded in the mid-Victorian period at Manchester (1870), Leeds (1878) and Liverpool (1885), all in a florid type of late Gothic which only he could have produced. The imposing buildings of Birmingham University (1909) represent a definite breakaway from medieval tradition, and are, to that extent, an advance; but to me they appear crude and distinctly vulgar. As a dignified contrast it is refreshing to be able to illustrate here the new buildings of Leeds

University, now being erected from designs by Messrs. Lanchester and Lodge who were successful in a competition held in 1927. The large group of older buildings by Waterhouse, mentioned on p. 78, is completely hidden by the splendid new range. The new work, which is in Portland stone, includes a lofty tower as a central feature, and the great Brotherton Library described and illustrated in the next chapter (see Plates 12 and 14).

I have left London University, the largest of all, to the last, because it is unique. It was founded before 1828, primarily to provide higher

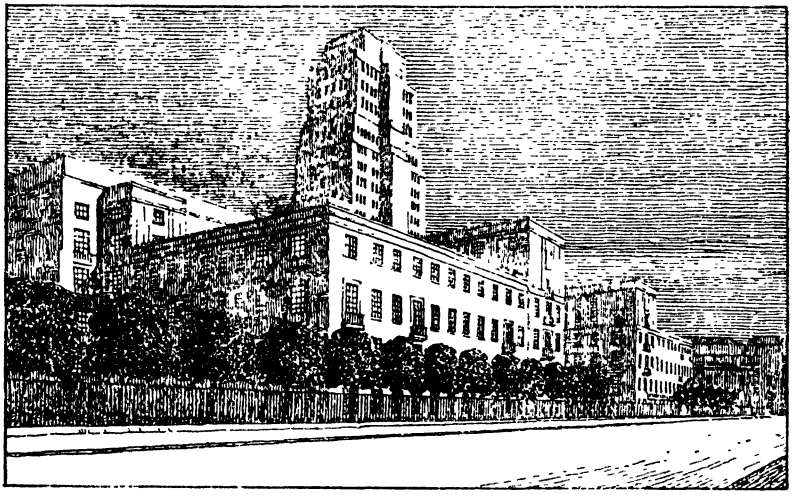
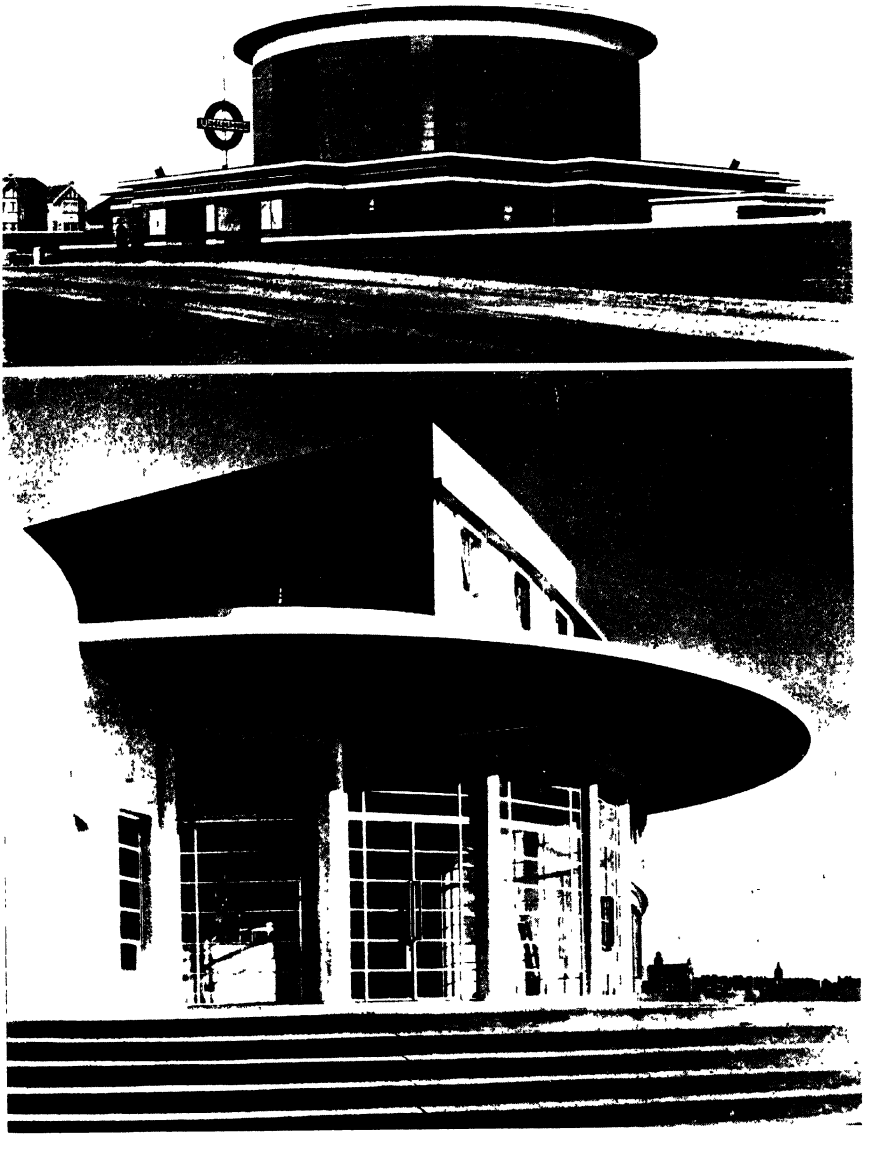


FIG. 9.—THE SENATE HOUSE, LONDON UNIVERSITY

education for 'dissenters' barred by religious tests from admission to Oxford and Cambridge; and originally consisted of University College in Gower Street, with excellent buildings designed by William Wilkins. Shortly afterwards it absorbed King's College, founded in 1831 with ecclesiastical backing as a counterblast to 'the godless college in Gower Street'; and since that date it has continued to swallow one college after another until now it embraces some forty institutions of university rank in its capacious bosom. The central administrative work of all this galaxy, added to considerable work involved in controlling its widespread external examinations for degrees, has long demanded a worthy central building, which should also serve as a visible emblem of the largest university in our great Empire; but not until 1923 was a site acquired with an area of ten and a half acres, in the heart of Bloomsbury—which hereafter will become

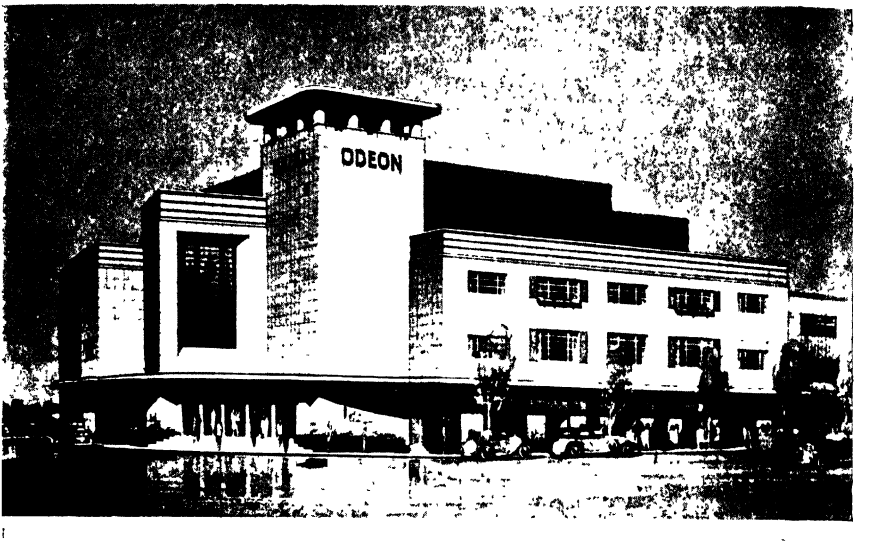
more than ever 'London's Latin Quarter.' Here a whole cluster of separate colleges and institutions will ultimately be housed; meanwhile, the huge Senate House (Fig. 9) was completed at the south end of the site just before the outbreak of war in 1939. Its colossal tower, 206 feet high, now dominates the surrounding streets and squares, and will be filled with books some day, as explained in the next chapter. Structurally, the most remarkable feature of the building is that its walls are composed of solid brick and stone: it has not a steel or ferro-concrete framework covered with a mere veneer of stone or brick. It has been so built to last for centuries, because its architect considered that our knowledge of the durability of buried steel is inadequate. The walls of the tower are therefore 6 feet 6 inches thick at basement level. People whose ideas of a university are still limited by recollections of picturesque medieval colleges in two ancient country towns find the vast stark walls of the new Senate House unfriendly and forbidding. They hanker after ivy, mullioned windows, and quaint corners generally. The tremendous social and academic prestige of Oxford and Cambridge seems to prevent them from realizing that the needs of a modern university in a great capital are quite different: the new buildings in Rome and Madrid show the new tendency. If you make a tour of the magnificent halls, rooms and staircases of the new Senate House in Bloomsbury, or of the new Brotherton Library in Leeds, you will admit that the skill of modern architects is capable of providing modern university buildings equal to anything that has gone before.

Technical colleges built during late Victorian times and early in the present century tended, too often, to be dressed up with a 'collegiate Gothic' exterior, no matter what workshops and laboratories lay behind. They were therefore often needlessly dark and cramped. During the last decade a welcome change has taken place, and England has borrowed from Continental Europe ideas of planning, lighting and equipment which were long overdue in this country. At the outbreak of war in 1939 it unfortunately became necessary to arrest a huge programme for building such colleges in most of the cities and great towns of England; but some had already been completed, and of those two are illustrated here (Plate 11). The small but populous and now partially industrialized county of Middlesex, for example, projected a dozen large colleges. That at Willesden (1934) has been enlarged, since the photograph reproduced here was taken, by the addition of another long range of workshops between the college and the railway. Both this and the Twickenham Technical



Above : Arnos Grove Underground Station. (*By* Adams, Holden and Pearson, FF.R.I.B.A.)
Below : Midland Hotel, Morecambe. (*By* Oliver Hill, F.R.I.B.A.)

PLATE 21



Odeon Cinema (*above*) at Weston-super-Mare and (*below*) at Bristol. (*Both by* T. Cecil Howitt, F.R.I.B.A.)

College (1938) are framed buildings of ferro-concrete construction with thin brick walls and flat concrete roofs. All internal partitions are light, and are so arranged that the space on each floor can be subdivided afresh if any change of requirements necessitates it.

A modern technical college in a town of moderate size should form the focus of all advanced education for the surrounding area and should also serve as a centre for social and cultural activities: for that reason it is often styled the 'Municipal College.' Nowadays its accommodation invariably includes not only an increasingly generous provision of space and equipment for teaching all subjects of an extensive curriculum, but also a large assembly hall, a gymnasium, a library, facilities for serving refreshments, and common-rooms for staff and students. The premises are usually occupied in the daytime by 'junior technical schools' for boys and girls under seventeen, and also by 'part-time' day classes for apprentices in engineering and other trades, released for attendance by enlightened employers: thus the heavy outlay on building has further justification than is supplied by the evening classes which have always figured so prominently in the system of technical education in this country. The new Shrewsbury Technical College—another example completed just before the 'axe' fell in 1939—is much less modern in treatment, and suggests an obeisance by its designer to the *genius loci*, including the old buildings of Shrewsbury School commanding the river bank not far away.

At the time of writing this, various officials and architects are trying to devise another type of school which may on occasion be merged in a technical college, or may be entirely separate from it or something betwixt and between: viz. the County College. Here will be gathered, for the equivalent of one day a week each—all the year round—*every youth and girl* between the current statutory school-leaving age (now fifteen) and eighteen. Some of them will devote part of this day to vocational studies, some will not, but all will be required to do some 'P.T.' This sweeping reform has been promised by the Government, sooner or later, but the enormous cost of the new buildings required constitutes a serious obstacle. In rural districts some use may be made of the idea of 'village colleges' established recently in Cambridgeshire, where a complex of one-storey buildings serves a group of eight or ten villages, and not only houses a 'senior' day school but also provides accommodation for social and educational work for adults in the evening (Plate 12*b*). These latter facilities are also being provided increasingly in new

'community centres' on housing estates, and possibly some of the projected County Colleges may be combined with them.

As this book deals with 'Building To-day', there is not much to be said about the public schools, for though they have done good work in the past and though many of them possess picturesque buildings of historic interest, their future status is so uncertain, and such bitter controversy is raging about them, that they are best ignored here: the same remark applies in even greater degree to the private preparatory school, the buildings of which are seldom of a modern character. Out of the dust of battle in this hard-fought field a few ideals are emerging which emphasize tendencies already apparent. For the great majority (at least) of all boys and girls in England, schooling will be divided into three periods after the earliest stage: from seven to eleven years of age; from eleven to fifteen (or sixteen); and from fifteen (or sixteen) to eighteen. At all stages attendance will be compulsory: up to fifteen or sixteen every day, from fifteen or sixteen to eighteen one day a week at a County College as previously described. The difference in standards of accommodation between 'elementary' and 'secondary' schools, already showing signs of being flattened out, will disappear: *all* schools for children over eleven will have the amenities of the present favoured 'secondary' school, including a library, dining-room, gymnasium and playing-fields. Whether the decrease in the number of children and the exodus to the suburbs will enable the L.C.C. and other municipalities to replace their great three-storey council schools on congested sites by one-storey glass-houses of the latest German pattern remains to be seen: if so, they must have them photographed on a sunny day while they are still snow-white before the soot has got to work. Sunshine everywhere—if you can get it, all staircases abolished or replaced where necessary by an occasional ramp, bright colours, smooth surfaces: these are some of the many desirable innovations found in the latest elementary and secondary schools of the day (see Plate 13*b*).

CHAPTER XIV

LIBRARIES

ONE's first thought of a library may be of a beautiful room, or series of rooms, richly decorated, and filled with cases of books tastefully bound in leather and vellum. It has been said that the Imperial Library at the Hofburg in Vienna (1722) is the most splendid of its kind in all Europe. So far as England goes, my own selection would be the library at Kenwood near Hampstead, designed by Robert Adam in 1769. Both these are, however, testimonials to the aristocratic culture of their age rather than workshops for students. Even such old favourites as Duke Humphrey's Library in the Bodleian at Oxford (1444–80), the imposing 'Radcliffe Camera' hard by (1749). and the elegant Pepysian Library at Cambridge (*c.* 1650) barely satisfy the exacting functions now demanded of a public or collegiate library by its more democratic users. Many modern libraries do manage to be architecturally beautiful, but they must be judged primarily upon their efficiency.

A small public library to-day usually consists of three separate sections all controlled from a single central desk: viz. lending section, juvenile section, and newspaper room in which a few reference books are usually to be found; but even in these small buildings there should be a private room for the librarian and a little work-room for his assistants. In larger buildings there will also be at least a reference room, probably a room where lectures and exhibitions can be arranged, and, if possible, a special room or gallery to contain the 'local collection' of books, maps, and prints describing and illustrating the town or district served. In very large libraries the bulk of the books, or at any rate those which are not often required, will be compactly stored in stack-rooms to which the public has no access. There will also be a map-room, a print-room, a music section, and so on. A whole room, or its equivalent in space, will be required for the catalogue, which may comprise several hundred large folio volumes —as at the British Museum—or may consist of hundreds of thousands of cards arranged in boxes alphabetically, by authors and subjects.

In almost all municipal lending libraries the public are admitted through automatically locking wickets; but in university libraries, where the facilities for study are usually ideal, admission is virtually restricted to members of the university. Arrived inside a public

library, the reader finds the books classified on one of two systems: either the *numero currens* system or the decimal system, usually the latter in a municipal library. In the former system, each accession receives a consecutive serial number when it arrives, regardless of its size, date, author or subject, and is placed upon a shelf next to the last previous arrival. It is obviously easy to arrange books thus and to rely entirely upon the catalogue in finding them; but imagine the motley appearance of a shelf so arranged!

It is equally obvious that such an arrangement is useless to the ordinary student and reader who wants to 'browse' amongst the shelves and to make his choice from volumes grouped together according to their subject. Hence when, as usual, 'open access' is in vogue, either the 'Dewey decimal system' of classification, or the Brussels system which is a modification of it, is generally adopted. It is very flexible and has become international. The whole field of literature and knowledge (excluding fiction and, as a rule, biography) is divided into ten main categories, each of these is divided again into ten sub-categories, and so on *ad infinitum.* Suppose, for example, you wish to consult a book on carpentry in a public library here, or even in many countries abroad. Under the decimal system this is *always* classified under '600–700, Useful Arts', subdivision '690–700 Building', sub-subdivision '694 Carpentry': and there you are! Fiction is usually arranged under authors' names alphabetically, biography under the name of the subject—not the author—alphabetically too.

The decimal system allows a library to be extended every day by slipping each new book into its right place in the sequence, assuming that ample shelf-room for expansion has been provided; but it results in a very untidy arrangement of books on each shelf, as the volumes are classified by subject without regard to size. This is a great drawback architecturally, compared with the old methods when books were arranged with more regard to their appearance and size than their subject-matter; and also requires that every stack must have adjustable shelves. Stacks should never exceed six feet in height, and tiers of galleries at six feet intervals, though permissible in little-used libraries belonging to learned societies, etc., are undesirable in municipal libraries.

In very large collections it is evident that the public cannot be allowed access to all the enormous range of books, so the bulk of them are stored in stack-rooms from which they are brought by attendants, with the aid of mechanical gadgets such as lifts and conveyer-belts,

to readers in the reading-room who have to rely on the author-catalogue and subject-catalogue to find what they want. These stack-rooms, although so tightly packed, occupy a great deal of space, and in the new university libraries of Cambridge (Plate 13*a*) and London (Fig. 9) are partly housed in a lofty central tower. Bound periodicals and newspapers constitute a problem in some of the chief libraries, and the collection from the British Museum has recently been transferred to a vast new depository at Hendon.

Shelving nowadays is usually of steel, and, though glazed book-cases do reduce the enormous amount of work entailed in dusting, the lack of ventilation is detrimental to bindings; so the usual practice is to install a system of mechanical ventilation and to avoid all 'natural' ventilation through open windows. Floors should be covered with rubber or thick cork lino to deaden noise.

Of the examples illustrated here, the huge new University Library at Cambridge (Plate 13*a*) dominates distant views of the town as King's College Chapel used to do, but, as it lies apart from the older buildings of the university, that does not matter greatly It certainly has no affinity to the Cambridge architectural tradition, and its bold eaves, roof of Lombardic tiles, and walls faced with small red bricks, suggest an Italian prototype; but the need for storing a great number of books explains the rationale of the design. Stacks of shelving occupy not only the great central tower, but also a substantial part of the rest of the block, which contains some fine reading-rooms. The spacious catalogue-room lies on the main axis of the building, opposite the entrance and behind the tower. The architect, Sir Giles Scott, has also designed the new extension of the Bodleian Library in Oxford, a massive stone building filled mainly with book-stacks.

The Senate House of London University, already described (p. 80, also Fig. 9), contains a very fine library extending over the whole of the fourth floor, with a stack-room occupying the lofty central tower, as already mentioned. Leeds University has erected the magnificent Brotherton Library (cf. p. 79 and Plates 12*a* and 14*a*) on a circular plan, following the precedent of the Reading Room at the British Museum and the new Central Library at Manchester. The catalogue-desk is placed in the centre, and there are sectional libraries in a ring of small rooms, surrounding the main rotunda, on each floor.

Plate 14*b* illustrates part of the interior of the library of the Royal Institute of British Architects in London, opened in 1934. Compared with the other examples just described, it is small, but it embodies some interesting features. The photograph shows the

interior of the Reference Room, with the issuing desk at the far end, and the card-catalogue extending right across the end wall behind it. (The books in this room are arranged on the 'open access' system already described.) The rounded ends of the steel bookshelves are radiators—insulated from the books by layers of cork—and also contain indirect lighting units. Natural light is obtained from tall windows on one side of the Reference Room. On the other side is the Lending Library, with a gallery for periodicals above it. In the galleries at each end of the Reference Room is accommodation, in steel presses, for the Institute's large collection of plans and drawings. There are also workrooms for the staff, a private room for research students, a room for the librarian, and stack-rooms. In institutional libraries of this type the medieval tradition of 'carrels' or bays for students is usually preserved; if so, the bays should be large enough to allow of a student being able to work in peace without being continually jostled by other persons wishing to consult or borrow any of the books ranged on shelves around him.

CHAPTER XV

TOWN HALLS AND COUNTY HALLS

DURING the last few years an increasing number of fine new town halls and county halls have been erected; and the outbreak of war interrupted many similar projects. It is certain that, as soon as urgent housing has been completed, a demand will arise not only for the completion of these but also for the provision of many more: either to replace inadequate and old-fashioned premises or to equip new townships with proper facilities for the discharge of public business. This chapter may well begin, therefore, with some explanation of the new needs that have created the present situation.

A town hall is, strictly speaking, a large assembly room for public gatherings under municipal auspices. An example is to be found in the Birmingham Town Hall built just a century ago. It is a magnificent auditorium for concerts and public meetings, equipped with a splendid organ, and has formed a dignified setting for many historic occasions; but it does not attempt to cater for the vast amount of business transacted by the corporation, and huge municipal offices have been erected in instalments ever since the town hall was opened;

indeed new blocks are still being built. Externally it resembles a Roman temple of the Corinthian Order. Far more imposing, and now as black as sin, is the great town hall at Leeds (1858), another 'Corinthian' building with a dome or tower of remarkable design. A wide and lofty flight of steps leads up to the portico, through which one enters the hall proper, over 160 feet long, 72 feet wide and 75 feet high. It contains one of the finest organs in the world, and here are held the famous Leeds Musical Festivals. The surrounding rooms include some dingy law courts; but the accommodation for municipal business is so meagre that a large block of offices had to be erected upon an adjoining site in 1884, these again being superseded by fresh offices in 1933. At Liverpool the town hall is much older (1754) and is still used for meetings of the corporation, but has been considerably modified since it was originally built and has been supplemented by municipal offices; the celebrated St. George's Hall (1854), like that at Leeds, was planned with the joint purpose of accommodating musical festivals and assizes, and the hall proper is a few feet longer than the Leeds example. All these buildings are imposing, gloomy and classic; but when the new town hall at Manchester was completed in 1877 it was imposing, gloomy and Gothic. Its size is enormous and its striking tower commands a view of all the surrounding district on the rare days when the Manchester smoke allows any view at all, but the hall proper is much smaller than those at Leeds and Liverpool, whereas far more space is devoted to other rooms, more than 250 in number. Even these have been found to be insufficient for modern needs, and in 1938 a large block of new offices was ingeniously planned on an adjoining site, designed in a brave effort to marry Gothic picturesqueness and inconvenience to modern ideas of light and efficiency.

Thus in each of these four great provincial cities there has been the same tendency: to erect imposing buildings in a traditional style, with more regard to magnificence than to the day-by-day transaction of civic business; and in each case, even at Manchester where far more generous provision was made, it has since become necessary to provide large new blocks of municipal offices. As for London, it must be remembered that it is only some sixty years since the affairs of all its various boroughs were amalgamated under the new London County Council, which also has a very light and tactful control over the affairs of the City; and it was not until long after that, in 1908 in fact, that an architectural competition was held for designs for a great new county hall on the south side of Westminster Bridge. The

successful architect was a hitherto unknown draughtsman, Ralph Knott, who died before the vast project was completed in 1922, at a total cost of over £3,000,000. Although it has a classical colonnade, this fine building does frankly proclaim its modern purpose with hundreds of windows for its hundreds of offices, but the steeply pitched roof represents a striving after picturesqueness rather than an expression of facts. Yet almost before the great block was completed, the huge increase of officials due to the extending scope of the County Council's work led to a demand for the erection of further blocks behind it, amounting in all to nearly as much accommodation as the original scheme had already provided, and a part of this extension has already been completed.

The increase of municipal and county work all over England is due to the widening scope of our social services: not only education, public health, housing, and poor-law relief have become more important, but such new departments as town-planning, motor-car licensing, and—lately—'A.R.P.' have been added to the list. The trend is ever upwards, and it seems most unlikely that it will move downwards in the future. To house the 'horde of officials', as they are politely described by anti-socialists, in conditions to ensure reasonable efficiency, requires much additional space; and the mere hiring of additional buildings near the town hall or county hall is not enough: officials must be on the premises. At the same time, a desire for civic dignity has arisen, among towns and counties with antiquated public offices as well as among newly created boroughs; so that to the demand for more administrative offices must be added a demand for a fine mayoral suite, a fine council chamber, and an assembly hall. I have met a lord mayor and at least one other mayor who, in private life, had been railway guards or railway foremen: hardly the sort of people one would expect to press for a sumptuous mayor's parlour! Nevertheless, they presided with dignity on the occasions when I met them, and doubtless maintained the dignity of their office on more ceremonial occasions.

This craving for civic splendour found visible expression nearly forty years ago in the beautiful Civic Centre at Cardiff, a monumental scheme which has never yet been surpassed. Whereas in Liverpool, Birmingham, Manchester and Leeds the town hall was built in the congested centre of a large industrial town, where every square yard of space was precious, the city fathers of Cardiff were fortunate and far-sighted enough to be able to acquire from the Marquess of Bute the very large rectangular space known as Cathays Park, adjoining

his castle. Round a central garden or 'campus' are ranged the City Hall, the Law Courts, the Glamorgan County Hall, the University College, the Technical College, the National Museum of Wales, and—recently—the Welsh National Peace Memorial. The first two of these buildings, erected in 1899–1906, formed the subject of an architectural competition, won by Messrs. Lanchester and Rickards. The style adopted was a monumental and free variant of the 'Baroque' architecture of Vienna in the eighteenth century, but the planning is masterly and there is no sacrifice of modern efficiency to historical tradition. Here, more than anywhere else in Great Britain perhaps, can you see civic architecture on the grand scale at its best.

But, as the Cardiff Civic Centre, or the most civic part of it, is now thirty-seven years old, I have not illustrated it here; instead I have chosen the Swansea Civic Centre (Plate 15*a*), designed in 1934 by Mr. Percy Thomas who had previously built the Technical College at Cardiff. It is an austere and beautiful building, but classic in spirit and furnished with the usual prominent tower. The entrance beneath the tower leads, through an ante-room, to the council chamber and ceremonial suite, occupying one side of a spacious courtyard, with the law courts on the opposite side; the remaining sides are occupied respectively by the municipal offices and by the large assembly hall seen on the left of the photograph. The town of Newport (Mon.) also boasts an attractive new group of civic buildings, finely situated and quite Italian in character—indeed only needing a few cypresses to complete the illusion.

The Civic Centre at Southampton (Plate 15*b*) was completed just before the war, and has since been badly damaged in hostile air raids. It, too, forms a group of simple and beautiful buildings, comprising town hall, municipal offices, police court, art gallery and art school. It stands prominently between the Central Station and the port, and is surrounded by a wide expanse of turf and tree-lined avenues, greatly adding to the monumental effect of the design. Very different is the position of the new City Hall at Norwich (1938) which faces the old market-place, flanked on one side by the lovely old church of St. Peter Mancroft and on the other side by the quaint flint Guildhall (Plate 16*b*). A block of rather dilapidated property occupying the west side of the market-place was demolished, and the new City Hall had to be crowded on to a rather cramped site. The accommodation comprises municipal offices on five floors, a council chamber, a handsome reception suite with lord mayor's parlour, and a block of police offices; together with some provision for future extensions. The

architects were faced with the problem of designing a large new utilitarian building in the very middle of one of the most historical cities in England. They have faced it boldly, adopted brickwork as the facing material, and crowned a rather severe façade with a tall slender tower, recalling some of the most recent architecture in Sweden. The market-place, sloping steeply downwards from the City Hall steps, has been enlivened by the use of standardized stalls covered with gaily-striped awnings, and the whole effect is most successful.

The new 'Guildhall' (municipal buildings) on the old market-place at Cambridge has aroused some hostility on the part of local die-hards who think that every typist there ought to be peering out through Gothic tracery, and yet it is not sufficiently Central European and un-English to satisfy the extreme modernists: it is, indeed, an admirably sane, artistic and dignified solution of a very difficult problem, and its light yellow bricks are all in keeping with local tradition. The enormous market-place at Nottingham has been stripped of its stalls and its history to constitute a formal piazza, gay with geraniums, since the imposing new 'Guildhall' (municipal offices) was erected at its end a few years ago. The lower part of the new building consists of shops and arcades, all very monumental, but nevertheless slightly below the dignity of a large city. Peterborough, too, has just built a new town hall with shops beneath and offices upstairs for letting, facing the old market-place and the ancient market-hall. On the other hand there is nothing undignified in the provision of electricity showrooms as part of a block of municipal offices. All the buildings described hitherto display some classical influence in their design: other recent specimens may be seen at Beckenham, Bognor, Bristol, Coulsdon, Leatherhead, Leeds, Luton, Slough, Swindon, Tunbridge Wells, Watford, Wimbledon, Worthing, and High Wycombe. These buildings, however, show, on the whole, a progressive drift from the prevailing civic fashions of a generation ago, when the Edwardian craze for Corinthian columns, swags of foliage, and eighteenth century ornament had barely expired. Now the stripping process has reached a stage when some prominent architects have begun to complain that the desire for economy has violated all canons of civic dignity and that we are getting down to bare bones, or architectural nudism.

The Hornsey Town Hall (Plate 16*a*) certainly gives that impression and is almost—but not quite—stark enough to satisfy the apostles of extreme *modernismus*. Nevertheless it is a very clever design, the

outcome of a competition in 1933 which was, as a critic neatly said, much more open than the site, a cramped space of irregular shape. The successful architect arranged the rooms, including a large assembly hall, with great skill and contrived some monumental effects in planning the main staircase. The new town hall at Wembley is another very austere design, built of yellow bricks. The new county halls of Hertford, Dorset (at Dorchester), Somerset (at Taunton), Wiltshire (at Trowbridge) and West Sussex (at Chichester) show in varying degree a use of classical *motifs* and proportions in their designs; but the first two of these are most severe and modern in character. Although it is generally expected that a great extension of social services will follow the war, it seems probable that the need for economy in municipal buildings will still prevail and that such grandiose efforts as the town halls of Croydon and Colchester will never be repeated in our time.

The problem confronting the designer of such buildings differs in every case. Apart from obvious variations in the shape and size of each site, the scheme may include any of the following: an assembly hall, municipal offices, law courts or police courts, police station, public library, art gallery and fire station—this last affording an opportunity for a striking feature in the tall tower required for drying the hose. The assembly hall may have to serve very diverse purposes —organ recitals, choral concerts, dramatic performances, public meetings, dances, banquets—and this fact greatly complicates the designer's task, for the acoustic requirements vary, and he must make up his mind, after consulting his building committee, which purpose shall take precedence over the others. A hall which is ideal acoustically for an orchestral concert is not equally suitable for a public meeting. Sometimes the architect is asked to provide a smaller hall adjoining the large one, with facilities for occasionally using the two *en suite* for dances or receptions; but that arrangement is seldom satisfactory because of the difficulty of preventing the passage of sound from one hall to the other when the two are being used separately, whatever kind of folding doors are installed. Whether an organ is provided or not, whether the platform is planned to accommodate a large chorus and orchestra or not, a cinema projection-room and screen are invariably expected nowadays, and the assembly hall should also be arranged with convenient access to the council room, reception suite, and mayor's parlour; these latter rooms should in turn adjoin the town clerk's office. On the other hand, the assembly hall must have its own separate entrance,

cloak-rooms, lavatories, and facilities for cooking and serving meals, for it will generally be used for non-civic purposes, and as such is a profitable source of revenue.

The acoustics of the council chamber, too complicated to discuss here, have frequently formed a stumbling block, but much more is known about this subject to-day than our fathers ever knew. As for the municipal offices, they should be placed in as quiet a position as possible, but some of the rooms—*e.g.* the rates office and the motor-licensing department—must be easy of access on the ground floor; and the borough engineer and architect will want plenty of light for their drawing offices, which should be placed on the top floor.

CHAPTER XVI

COMMERCIAL BUILDINGS

UNDER this comprehensive title may be grouped banks, office buildings, shops and factories. Taken as a whole, commercial buildings in England exhibit more modern design than appears in any other type of structure considered hitherto in this book. That is natural, for preconceived ideas of style which have lingered so long in our churches, our schools, and even our houses, are less popular among 'hard-headed' business men than among people in general. Oddly enough, however, one can search high and low for really modern designs for banks, either in town or country. 'Safety First' seems to be the slogan that has inspired their architects, or the directors who instruct those architects; and nearly every recent bank displays some form of 'Free Classic'—usually monumental and almost invariably expensive—in its street façade as in its interior. The functional requirements of all but the largest banks are simple enough: a spacious hall to which the public has access, with ample space in front of a massive counter defended by a metal grille, and a wider space behind the counter for the various clerks' desks. Then there is a Holy of Holies for the manager, entered from the public space; and, of course, a strong-room. This last feature often presents a difficult problem for the architect, as it must be well ventilated as well as fireproof and burglar-proof, and must also be very dry. If placed in the basement, it needs to be made water-tight, especially in damp or waterlogged ground, by means of a continuous jacket of asphalt between layers of brick-

work or reinforced concrete; if above ground, its thick walls are constructed of blue bricks or reinforced concrete. In any case, it has a massive steel door controlled by ingenious locks which open only to a complicated sequence of secret numbers or letters. Air raids during the recent war threw a strain on some strong-rooms that they were never built to withstand, and I have seen famous safe-deposits in the City of London lying open to the gaze of passers-by. Usually the premises of the 'Big Five' banking companies are designed by architects wholly or partly in their service; and very often, in small towns, their task is to fit the accommodation just described into a former shop site, deep from front to back with a narrow frontage. The planning is therefore frequently difficult, in spite of the relatively simple requirements; and it seems to be assumed that the façade must express conservatism, dignity, and ample resources typified by first-class materials and craftsmanship. This is all to the good, and is perhaps a better ideal than a standardized front, but it does not appear to produce any startling modernity of design.

Blocks of office buildings, usually with shops or banks beneath them, tend each year to become more light and airy. Recently another tendency has appeared: each storey is left almost empty within the enclosing external walls, so that the total space on each floor may be divided up, to suit the special requirements of tenants, by thin partition walls erected after the main structure has been completed. Such buildings are usually erected as a speculation by a property owner or syndicate, and the tenants appear on the scene at a later stage. To leave the floor space as clear and as 'flexible' as possible, lifts and staircases and lavatories are concentrated in the most convenient position for the average tenant, and are, of course, built at the same time as the external walls, together with the steel or ferro-concrete stanchions which carry the inner part of the structure and make this elastic planning possible. The defect of the very light partitions used for subdivision of offices is their liability to transmit noise from one office to another. The decoration of modern offices, with steel filing cabinets and stainless steel furniture, is refreshingly simple; but it is customary to display more lavishness in the board-room. There the question of acoustics is vital, assuming that all directors are old and deaf and toothless, so the use of panelling, carving and very thick carpets is utilitarian rather than ostentatious. Except in the board-room, where a concession is sometimes made to the Englishman's incorrigible love of an open fire, central heating for office premises is now universal: a reform which must console the

hordes of weary charwomen who still tend the countless coal-burning grates of Whitehall and the City.

'Shopping' continues to form the inexplicable pastime of many otherwise sane and intelligent people, and in recent years the large departmental stores have exploited this human weakness to the full. 'Why not spend the day at Selfridge's?' asked an advertisement in every Tube train soon after that famous store opened its doors to Londoners in 1909; and the enterprising Mr. Selfridge—with his roof garden, his restaurant, his travel bureau and all the rest of it—left no stone unturned in his artful cajolery. Others followed, and now even escalators are provided—I have seen one in a comparatively small shop in Watford—to ease the rigours of 'shopping.' All this is cruelly hard on the small shopkeeper in a village or country town, who sees his customers flitting in droves to the nearest city on 'cheap fare' day. Almost equally cruel to him is the arrival in every country town of the chain-store business, whether it be a druggist, a caterer, a stationer, or a sixpenny what-not. This raises the architectural question of shop fronts. Should the well-known white and gold fascia of one huge firm of caterers, or the long scarlet and gold fascia of a celebrated firm of hardware merchants, be introduced into the architectural features of every branch in every town from Cumberland to Cornwall, regardless of the local architectural tradition? It probably has a substantial publicity value, and as such cannot be condemned out of hand, but it reduces the individual character of many charming old High Streets. In a few such towns, an attempt has been made to control the design of shop fronts, so that in Canterbury, Chester and Stratford-on-Avon, to name only a few, shops and banks have blossomed out into ornate half-timbering. This, however, cannot be expected to be popular—indeed it is barely reasonable to-day—and one can only ask for honest building coupled with architectural reticence and neighbourliness. The Selfridge Store, such a marvel in its day, is now generally considered to be one of the foremost examples of architectural hypocrisy, with its huge classical columns concealing the skeleton of steel framing that really carries the load of the structure; and the recently erected store of Peter Jones in Sloane Square (Plate 17*a*) is regarded as a more appropriate expression of mercantile magnificence. Slightly less daring in conception, but very English, dignified and attractive, is John Barnes's Store in Finchley Road, Hampstead (Plate 17*b*), where the lower floors are occupied by the shop and provided with escalators, while the upper storeys are occupied by residential flats of varying accom-

modation (p. 70). In all retail stores, large and small, display of goods is the sole purpose of the shop window; and all piers and columns are disliked as interfering with such display. The problem of design is very difficult, for if one clothes the necessary supports with mirrors so that they are almost invisible, the eye feels a need for some evidence that adequate support is there. Mention of mirrors reminds me that the drawback to display caused by reflections in large plate-glass windows can be obviated, at a price, by the use of a concave mirror at the bottom of the window. This creates the remarkable illusion that there is no glass in the window at all, and neutralizes all reflections.

Up to a century ago factories were situated mainly in the North of England and well merited Blake's description as 'dark Satanic mills.' They were called 'mills' because they were formerly driven by water-power from the fast-flowing Pennine streams, and they still retain that name in Yorkshire and Lancashire. They were certainly dark, they were ugly, and they lacked every amenity that an industrial worker now rightly expects. Sometimes an effort was made to render them 'artistic', and I well remember the cold shudder with which I realized one day, as a young architectural student, that a rather ornate brick factory chimney in the shabbiest part of Leeds was a faithful copy or caricature of Giotto's famous marble tower at Florence: this was attributable to the fact that its wealthy owner had achieved culture after becoming prosperous. Nowadays the artistic sense of industrialists finds an outlet in other ways. Whether you like them or not, the new factories built on the north and west of London (Plate 18*a*) during the last few years are cheerful and bright, with a range of administrative offices facing the main road and often set in a pleasant garden. Manufacture goes on in spacious sheds behind, with roof-lighting that proved to be something of a nuisance during the 'black-out'; but with every device that modern science can suggest to ameliorate working conditions. 'Industrial fatigue' is now a recognized subject of investigation, and its cure depends very largely upon architectural factors including lighting, heating and ventilation. Smoke is almost eliminated because electric power is used. Modern construction in reinforced concrete has permitted an enormous increase in the window area of multi-storey factories, such as those of the Gramophone Company at Hayes, Middlesex; and trusses formed of steel lattice-work allow of roofs with huge unsupported spans, so that a thousand men can work in a one-storey workshop without a single

column or pier to interrupt the floor space. Canteens and rest-rooms are normal adjuncts of every large modern factory, and usually playing-fields are also provided. Whatever the product, the buildings are always planned to allow of an orderly sequence from the reception of raw materials at one end, through the various processes of manufacture, to the final stage where packing and storage precedes loading for despatch. The need for uninterrupted floor space, already mentioned, often leads to the slinging of heating pipes and radiators from the roof or ceiling, an arrangement which has drawbacks as well as advantages. On the other hand the old-fashioned system of innumerable belts and shafting suspended from the ceiling and connected to an enormous fly-wheel coupled to a steam-engine—the usual practice in my boyhood—is now largely replaced by electric motors on the floor, coupled to each machine by a short belt. This produces a much better internal effect, and overhead heating systems have recently been greatly improved.

There are other new tendencies in factory-building. Whole new estates have been laid out with model factory sites grouped together, and furnished with sundry communal facilities, adjoining good railway and road services: probably the best example is the Team Valley Estate south of Gateshead, established there to relieve a largely unemployed population. At Welwyn Garden City, and possibly elsewhere, factory 'units' have been built and can be let as required by customers, who hire as many units as they need. This method is particularly suited to small new businesses which may expand. The recent admirable report on the replanning of Birmingham, published by the Bournville Village Trust, envisages a large number of 'flatted' factories, where the owners of the small metal industries with which Birmingham abounds may hire one or more floors of a multi-storey factory: this system allows of compact planning in the centre of the city.

CHAPTER XVII

RAILWAY STATIONS AND HOTELS

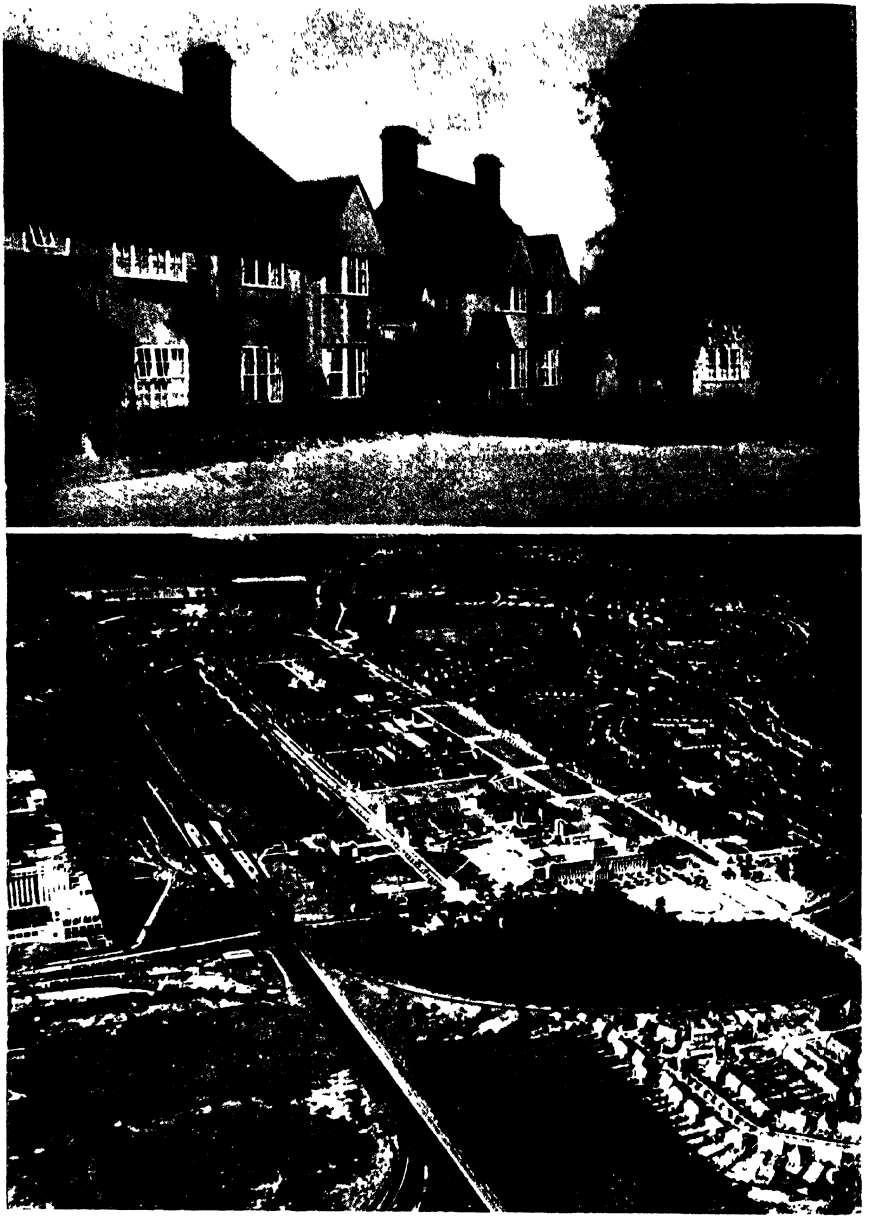
THESE two types of building may be regarded as travellers' architecture, and in fact are combined as one in such buildings at St. Pancras Station in London, where the station proper is masked from the main street by a huge and elaborate Gothic hotel, which has been

Left : Interior of Savile Theatre, London. (*By* T. P. Bennett, F.R.I.B.A., and Son.)

Below : White Rock Pavilion, Hastings. (*By* C. Cowles-Voysey, F.R.I.B.A.)

Photo : The Builder

PLATE 23



Above : A View in Hampstead Garden Suburb. (*By the late* Geoffrey Lucas, F.R.I.B.A.)
Below : Air View of Welwyn Garden City. (*By* L. de Soissons, A.R.A., F.R.I.B.A.)

used, however, solely as offices for several years. This combination removes the need for attempting to make the station look like a station externally (see p. 28 in this book), and thus does nothing to solve the question of what a station should look like. Ruskin, who hated railways almost as bitterly as he hated architects, had a simple remedy to offer.

The railway station, he tells us, 'is the very temple of discomfort, and the only charity the builder can extend to us is to show us, plainly as may be, how soonest to escape from it.' Of railways he writes: 'Keep them out of the way, take them through the ugliest country you can find, confess them the miserable things they are, and spend nothing upon them but for safety and speed.' He then proceeds to jeer at the prevalent craze for decorating the iron roofs and columns of railway stations with bits of Gothic or Greek ornament, and there he would be supported by most intelligent people to-day, as well as by young modernist architects. The day of the 'period' railway station, whether Gothic or Greek, is over; and the type of design now usually adopted varies from the mildly classic façades still favoured by some of the four big trunk railways to the really stark modern designs selected for the latest Underground stations in and round London, and a few on the L.M.S.R. (*e.g.* on the London-Southend line). As I have said previously, the stations on the Tube from Turnpike Lane to Cockfosters, as well as some on the other London tubes, even if they could not be recognized at first sight as railway stations, could not possibly be mistaken for medieval Flemish town halls or Greek temples shrouded with soot. These stations consist of a booking-hall at street level, with staircases or escalators leading to the platforms below, and the high-level building may be either in the form of a drum, as at Arnos Grove (Plate 20*a*); or a cube, as at Enfield West; or a rectangular block with a rectangular tower, as at Turnpike Lane; or in various other rather uncompromising forms, but one and all in dark red brick as against the stucco finish beloved of most modernists. There is certainly no nonsense about them, and they have been designed by the talented firm of architects who produced the Senate House of London University; but one has a suspicion that they are admired rather because they are free from meretricious ornament than for any positive merits of their own, though the first quality mentioned is a decided recommendation. The same firm also produced the very fine block of offices over St. James's Park Station, but it cannot be claimed that this beautiful building (Plate 1) is a railway station itself, or that

it affords any guidance as to what a railway station should look like. The answer is probably to be found, as already remarked (p. 28), in examples outside this country, where the exposed end of a terminal station frankly displays the ends of the arched roofs covering the platforms, or the flank of a huge 'concourse' or waiting-space at the entrance to the platforms. There is an enormous example of this at Leipzig, and others in some large Italian cities. To my mind, the Gare d'Orléans at Paris, florid as it is, conveys clearly to a stranger the nature of its function: it could never be mistaken for anything else. A spacious concourse, such as has been provided at the huge Waterloo Station in London (1922), is desirable at all large termini; and the introduction of electric traction will make all our stations cleaner and smarter some day. Generally speaking, we are far behind continental cities in the approaches to our chief stations, which are sited in squalid surroundings and approached by mean streets, giving the worst possible welcome to a visitor. At Welwyn Garden City (Plate 23*b*), one of the few English towns planned artificially in modern times, the railway station takes its proper place as a prominent feature in the lay-out and is approached by a wide avenue. Nowhere is the need for scientific and artistic town-planning more urgent than in this respect.

The new Queen's Hotel at Leeds (1938), fronting City Square, is a huge stone building of many storeys, masking a remodelled station, and most luxuriously appointed. It takes the place of a rather shabby predecessor, beside which rose a huddle of iron roofs and decrepit woodwork, and was long overdue, as the Square itself is more dignified than most and was laid out about forty years ago with numerous statues of some merit. In such a situation one of the chief requisites is protection against noise—from the street on one side and the railway on the other. In fact, similar conditions apply to most hotels, even in small towns, because they are usually situated on busy highroads. In a previous chapter I have said that modern medical men are convinced that noise is harmful to the nerves, hence to the whole human system; and quiet is particularly essential for busy people whose work involves frequent nights in hotels. In the Queen's Hotel at Leeds, as in others of its kind, ventilation by means of open windows—admitting dirt as well as noise—is out of the question, and an elaborate system of mechanical ventilation must be installed, while double windows are desirable. The ventilation trunks and fans are apt to produce internal noises, and must be specially designed to avoid that risk. Partitions between bedrooms

are often made very thin and of resonant materials, but should be fairly thick, or have some form of sound insulation, as nothing is more disturbing than the noise of the snorer next door. Corridors should be heavily carpeted to neutralize the bad manners of the oaf who throws out his boots at 1 a.m. with a cheerful crash. Other sources of noise are bathrooms, lavatories and lift shafts, which should be separated from bedrooms by linen-rooms or at least by built-in cupboards. Permanent residents in some hotels are addicted to radio, so rooms let to them should be separated in some way from those allotted to casual guests. The reproach levelled at our hostelries by visitors from overseas, up to a few years ago, that running hot and cold water was seldom installed in bedrooms, is now hardly applicable; but the familiar gibes about our bad cooking still persist.

Lounges tend to become brighter, more homely, and much less vulgar than they used to be; but here there is still room for improvement. As for external appearance, the tradition of 'Ye Olde Englyshe Inne' remains obstinately rooted, and examples of costly and elaborate buildings with oak half-timbering, richly carved, are still being erected on quite urban and suburban sites round London and elsewhere. Even in historical old towns there is no need for this affectation, and some of the talented architects employed by the great brewery companies have shown that they are equally capable of designing mildly 'traditional' or frankly 'modernist' hotels. The two examples illustrated on Plate 19, designed by the same architect for the same brewery company, display considerable versatility. The 'Comet' at New Hatfield, adjoining the aerodrome of the London Flying Club, is as modern as you could wish, inside and out, and that is quite appropriate in such surroundings. It is a gay, lively, attractive composition with its cheerful flower-beds and flower-troughs. The photograph hardly shows the extent of the accommodation which includes, upstairs, twenty-six bedrooms for guests and staff. On the other hand the 'Bull and Butcher' at Whetstone stands on the Great North Road, formerly a famous coaching highway, and here the architect has evidently thought fit to give a deferential bow to tradition without descending to absurd anachronisms in the form of half-timber. The new Midland Hotel at Morecambe (Plate 20*b*) is an example of railway architecture at its brightest and best; and also displays the modern spirit without being aggressively bizarre; indeed if all the manifestations of that movement were as wholesome and sane as this, most Englishmen could swallow them without a gulp.

This charming hotel stands on the promenade at Morecambe, with its convex side (containing a large café) facing the sea and the beach, and the concave side facing the land. The main entrance is in the centre of the landward side, and has a tall curved pavilion above it containing a huge window. The balconies or terraces to the two upper floors of bedrooms are a distinctive feature, giving strong horizontal lines and a prevalent Italian effect. At one end of the seaward front is the curved loggia illustrated on Plate 20*b*, with its boldly projecting concrete roof.

CHAPTER XVIII

BUILDINGS FOR PLEASURE

UNDER this heading one might treat many types of building—skating rinks, golf-club houses, sports pavilions, swimming baths—besides those now to be described, viz. theatres, cinemas and concert halls or music pavilions. Considerations of space set a limit to the topic, and the buildings chosen for this short chapter all have one feature in common: they depend in large part upon the architect's skill in mastering difficult problems of planning and acoustics. The functional needs of all these structures are obvious: that every member of the audience shall be able to reach his seat in comfort, escape from it rapidly to safety in case of fire, and be able to see and hear everything that takes place upon the stage or platform. Yet if you look at the plans and sections of a modern theatre you will be surprised to see how comparatively small a part of its total bulk is occupied by the auditorium; and, moreover, how much of the stage is 'behind the scenes.' Experts assure us that, in a modern theatre, the total area of the stage space should be four times as large as the part which you can see, and the total height of it four times the height of the stage scenery: all this to allow of the changing of scenery, etc. The owner naturally wants to utilize every available inch of space for auditorium, in order to squeeze the last penny of profit out of a usually expensive site and an always costly building; but besides the auditorium, the large stage, and the refreshment bars which his patrons expect, he has to provide an assembly-room or green-room; a whole suite of dressing-rooms, chorus-rooms and ballet-rooms, with baths and lavatories; rooms for the manager and his assistant,

conductor, and organist; wardrobe-rooms; workshops for the carpenter and electrician; office for the clerk of works; store-room for instruments; music library; and many other miscellaneous items.

The oldest theatre in this country, of the open-air type but with an architectural stage, is to be seen at Verulamium near St. Albans and is well worth a visit: it is Roman. Even earlier than that period the Greeks used earthenware jars in the construction of their theatres to improve acoustic conditions. Nothing remains of the theatres of Shakespeare's time, though conjectural restorations have been made, and the oldest in England is the Theatre Royal at Bristol (1766). Old theatres and opera-houses, especially in Italy, were often all the more successful acoustically because the auditorium was not only interrupted by numerous columns, galleries and boxes, but was lavishly decorated with ornament in bold relief so that the sound waves were broken up in their course. The whole trend of theatre design, as of cinema design, during the last few years has been in the direction of simplicity. Structural columns have been eliminated, only one gallery is favoured, boxes are omitted, and all the surfaces are smooth and gently curved so that sound is quickly—often too quickly—reflected. These structural changes have been made possible by the skilful use of steel and reinforced concrete, with girders requiring no structural columns; but the omission of ornament is simply a matter of taste, and now architects are beginning to insert flutings and other decorative features to produce the optimum length of reverberation. This process is known to-day as 'diffusion', and seems to have been well known to Baroque theatre designers of the eighteenth century in Italy, who did not insert all their exuberant architectural details out of pure *joie-de-vivre*.

If you must have simplicity in a modern theatre or cinema, and certainly that accords with my personal taste, you must be prepared to cover certain parts of the walls and ceiling with absorbent materials, such as felt, quilting, or 'acoustic' plaster, but that can be done without detriment to appearance: in fact you need hardly know that it is there.

First of all the architect has to determine the shape of the theatre, the best forms being parabolic, pentametric approaching a parabola, and fan-shaped. Then he has to prepare an 'acoustic diagram', a feat which was quite unknown when I was young. By this means he is able to calculate the length of reverberation, which should be shorter in a theatre than in a concert hall. He then has to reckon how

much sound will be absorbed by the various surfaces—according to the material used—by open windows (if any), by carpets and hangings, by furniture and upholstery, and, last but not least, by the members of the audience. In a theatre or cinema he assumes that the auditorium will be two-thirds full, in a concert hall quite full. If, as usually happens, he finds it necessary to make provision for reducing echo from his slick streamlined surfaces, he then has to provide the requisite area of absorbent material until the length of reverberation reaches the optimum or ideal. Since sound films were introduced less than fifteen years ago, cinemas have had to comply with all these acoustic conditions: hitherto it was not so necessary, but even then an orchestra of some sort was provided to enliven people and to deaden the noise of the running film. The march of science has since produced the cinema organ, which appeared in England about twenty years ago.

A certain vulgarity, which is certainly un-English in its lack of reticence, appears in the names and often the façades of our super-cinemas, usually intended to suggest exotic opulence: Splendid, Regal, Majestic, Ritz, Eldorado, and so on. One does not ask for half-timbering or Georgian sobriety in a building that has to make its profits by pandering to popular taste for the sensational, but far too many villages and old country towns are vulgarized by the local picture house. I remember seeing an example in Shaftesbury, intrinsically a pleasing and skilful design, but blatantly out of place on one of the most historic sites in England. The two cinemas illustrated on Plate 21 are reasonably cheerful and modern, but neither aggressive nor vulgar. Seaside concert halls or pavilions are in rather a different category: their situation usually demands something gay and modern. There are several excellent examples along the south coast, among which the White Rock Pavilion at Hastings (Plate 22*b*) is a notably good design, while the De la Warr Pavilion at Bexhill (1935) may be cited as one of the most striking works of 'modernism' in this country. A splendid example of a modern concert-hall is the new Philharmonic Hall at Liverpool, where architectural excellence is combined with acoustical efficiency.

CHAPTER XIX

DEALING WITH OLD BUILDINGS

IT might be thought at first sight that the subject of this short chapter is quite out of place in a book on 'Building To-day'; indeed there are many iconoclasts who would argue that all old buildings should be left to rot, or be demolished, to make way for sensible modern streamlined structures of concrete and steel. That is all very well for iconoclasts and theorists, but in point of fact most people, even architects, have a sentimental regard for meritorious old buildings, and far too many architects short-sightedly live in antique houses (skilfully modernized with h. and c. in all the bedrooms) when, from the point of view of sheer salesmanship, they would be much better advised in their own interests to inhabit a dwelling which exhibits the latest fashions from overseas. Old buildings often have to be enlarged, adapted or modernized; either because they have a real value architecturally and historically, like some famous cathedral or charming manor-house, or because accommodation can be obtained in them at a lower cost than would be entailed by complete rebuilding; hence the argument for reconditioning rural cottages.

The problems involved in such alterations may be divided into two groups: questions of taste, involving a decision as to the style and manner of restoration; and practical questions relating to the structure. Take, for example, the very obvious case of Wren's City churches, some fifty in all, of which about half were completely destroyed or irreparably damaged during the air raids of 1940–41 on London. Should they be rebuilt at all, as their parishioners have now shrunk to a mere handful of caretakers and the like? If so, should they be reconstructed as exact replicas of their former state? The first question is, of course, a matter of ecclesiastical policy, not of taste; the second is, however, certainly a matter of taste. The same problem arises if the building destroyed is a group of Elizabethan timbered alms-houses, a Georgian brick mansion in a park, or a stone manor-house in the Cotswolds. It arises in the same form whenever an old church tower has to be rebuilt, or a wing added to an existing dwelling of any age. Fifty years ago probably, eighty years ago certainly, all architects and all educated 'amateurs' would unhesitatingly agree that rebuilding must follow exactly the old forms, and that any additions must harmonize with them in design, colour and materials.

That great Victorian restorer of cathedrals, Sir George Gilbert Scott, R.A. (grandfather of the modern cathedral builder Sir Giles Gilbert Scott, R.A.), not only saved many noble buildings from collapse by his great skill in construction, but also dealt so drastically with any details that did not satisfy his zeal for uniformity that he aroused violent criticism even in his own day. He would cheerfully rip out of any cathedral such fittings and furniture as were not of his own pet period: thus he swept away beautiful carved screens, organs, etc., that were not Gothic, and he would replace any features that were at all shabby by brand-new ones, historically correct in design, but terribly bright and shiny. All this wholesale renewal led to the formation in 1877 of the Society for the Protection of Ancient Buildings (founded by William Morris the great amateur craftsman, poet and socialist), with the expressed object of reducing 'restoration', which had become a byword, to the minimum. Old buildings were to be treated reverently, and altered as little as possible; but if new work had to be inserted, it should not pretend to be old work, and should be clearly differentiated as new work.

The best answer to the question about rebuilding a completely demolished historical building is probably the statement made by a well-known and thoughtful architect recently about Wren's churches: 'A destroyed building should only be reproduced if its design is such that it could appropriately have been built now for the first time had it never existed before.' As for additions to historical buildings, my own view as a life-long student of architectural history may be considered old-fashioned. It is that any additions should harmonize in colour and texture, and as far as possible in character, with the existing design. Thus I should deprecate the addition of a staring white concrete wing, with predominantly horizontal lines and stainless steel fittings, to an old stone gabled manor-house, because it seems to me to be sacrilege of a sort. The effect is blatant, strident and essentially vulgar. The newcomer is asserting himself against the spirit of Old England, which to some of us means something; he is like a man playing jazz on a ukulele in an old church. On the other hand a measure of departure from the existing lines is justifiable to meet modern needs; and even I, with my historical bias, was rather shocked when, as a young articled pupil, I heard instructions being given by my chief to have the stone front of a new wing treated with a mixture of beer and soot to match the old! This is on a par with the thriving industry of 'sham-antique-making,' where pieces of fake furniture not only have worm-holes bored in them, but are

kicked about and bashed with a hammer to give them 'that genuine olde worlde look.'

When it comes to practical measures one can be more confident. The chief defect in old buildings, especially old houses, is that they are often very damp in spite of their thick walls. Much of this damp rises from the ground, because the modern idea of a 'damp-course' (see p. 48) was unknown a century ago. Very often it is possible to insert a damp-course in old walls, a difficult but most ingenious operation. At the proper level (*i.e.* below the ground-floor level, but above the surrounding ground, which may have to be dug away close to the house), a layer of stones or bricks is taken out in short lengths of a yard or so, the new damp-course (usually of slates bedded in cement) is inserted, and then the stones or bricks are replaced. Only a wide joint remains to show what has happened. The other chief source of ground-damp is the earth surface beneath the ground floor, where nowadays a layer of cement-concrete is always insisted upon by local by-laws. This, too, can be inserted by taking up the boards or paving-stones or tiles of the old ground floor, room by room, and laying the new concrete at an appropriate level. Where it is necessary to lower a floor, in order to give additional height to a room on the ground storey and bring it up to the modern minimum of eight feet from floor to ceiling, the excavation will probably reveal the foundations; so these, too, will have to be lowered by the process of 'underpinning' just described, and a damp-course will have to be inserted in each. Old foundations of walls often fail and give rise to cracks above: new concrete foundations can be built under the walls in short lengths, again by means of underpinning. Still more ingenious is the method of 'grouting' used to strengthen and consolidate old stone rubble-filled walls which contain hollow spaces and lime mortar which has lost its binding properties. Grout is a semi-liquid mixture of cement and water which is pumped into the interstices, care being taken that it cannot escape on either face of the wall during the operation. By this means much of the decaying fabric of Lincoln, Winchester and many other cathedrals has been preserved.

Dry rot is a scourge that attacks many old buildings: it is a fungoid growth which flourishes in warm, dark, unventilated spaces. Its spores may be carried on a workman's clothes or tools as well as on the timber itself. When a floor is completely covered with linoleum, or when a careless gardener heaps up the earth of a flower-bed over the air-bricks that ventilate the space under a wooden floor, conditions

are ideal for the spread of the disease if the fungus is present. The remedy is drastic and expensive, involving the cutting out and replacement of all infected wood, and the sterilizing, by blow-lamps or solution, of all adjoining surfaces including even brickwork and concrete. The so-called 'death-watch beetle' is another cause of trouble, and is similarly encouraged by warm dark conditions: hence its ravages in the lovely carved roofs of many old churches just because men have learned how to heat those churches properly! Generally speaking, renewal and sterilization are necessary here too; but the wonderful roof of Westminster Hall, the finest in all England, has been strengthened at vast expense by steel trusses artfully concealed inside and above the huge but now hollow timber beams.

CHAPTER XX

TOWN-PLANNING

THESE two words are very much in the air, and also 'on the air', at the present time. Yet town-planning as a science or an art or even as a term is barely forty years old, and when I was a student it was never mentioned. Possibly some readers may consider that it should not be discussed, even briefly, in a book on 'Building To-day'; so I will begin by quoting the definition of town-planning given in *The New English Dictionary*: 'The preparation and construction of plans in accordance with which the growth and extension of a town is to be regulated, so as to make use of the natural advantages of the site, and to secure the most advantageous conditions of housing and traffic, the convenient situation of public buildings, open spaces, etc.' The phrasing is stilted and donnish, but the idea is there. Unfortunately the idea was *not* there when the great growth of our industrial towns took place during the nineteenth century. There have long been, as I said in a previous chapter, rules prescribing the width of streets and the air space around houses, but nothing to regulate the amenities of a town, its dignified lay-out, or its traffic requirements. The most squalid aspect of many of our great cities is encountered by a visitor as he steps out of their railway stations, where, if anywhere, a good impression is desirable: in fact, they have never been planned at all!

Town-planning is not, however, an entirely new art: both Greeks and Romans understood it; and, even in the remote Roman province

of Britain, such towns as Verulamium (near St. Albans) and Silchester (near Reading) were properly laid out. The fine model of Silchester in the museum at Reading shows you that the lay-out was on a grid-iron pattern; modelled indeed on the arrangement of a military camp, but none the less carefully arranged. The tragic story of Wren's scheme for replanning London after the Great Fire of 1666 is well known, and has been recalled to popular notice since the air raids of 1940–41. Many famous European towns were remodelled afresh with fine boulevards after their fortifications had been demolished, and at Richelieu in France a completely new town was laid out in 1631–38. Though in England we did very little in that direction, most English provincial towns up to a hundred years ago were pleasant and attractive places; and some admirable development was done by speculators at Bath, Cheltenham, Brighton and Weymouth. Except for a few attempts to establish properly planned new towns, *e.g.* at Middlesbrough (1829) and Saltaire (1852), both in Yorkshire, nearly eighty years of indiscriminate building followed, resulting in the appalling muddle that we all know so well; and not until the 'First Garden City' was founded at Letchworth in Hertfordshire in 1903 was there any real endeavour to deal with the problem scientifically and artistically.

This brief excursus into history is necessary because, even now, little has been done to make up the leeway lost in a century of blind neglect. Letchworth and its sister town at Welwyn (1920) in the same county remain our only complete examples of the garden city proper; and, as many people still regard them as the ideal models to follow after the present war, it must now be explained what their promoters set out to achieve. It was assumed, and with the assumptions we can all agree, that cities have become too big; that their inhabitants are cut off from easy access to the country; that they spend too much time 'strap-hanging'; and that dwellers in their suburbs tend to lose their civic sense because they are swamped by the mere size of the huge agglomeration. It was decided that, in order to provide efficient municipal services, a reasonable concentration of industry, and all amenities of the ordinary kind, the new garden cities should be planned for an ultimate population of about 32,000 (as at Letchworth) to 40,000 or perhaps 50,000. This population could not, however, support some of the amenities—such as a university—which one expects in large cities, but the idea was that the first new garden cities should be situated within reach of large cities, and hence they acquired the name of 'satellite towns.' People who support

this idea to-day estimate that from forty to a hundred new towns should be distributed over England after the war, some of them absorbing small towns which exist already; and that their inhabitants should be drawn from cities which are too big. Round each town there is to be, under this scheme (as at Letchworth and Welwyn), a wide strip of agricultural land, where vegetables and milk and other farm produce can be obtained for the citizens; and every citizen will be able to walk into the country within a few minutes from his own door. Local industries will absorb local labour, strap-hanging will become unnecessary. The whole area is properly laid out, and sites reserved for public buildings, schools, churches, shops, hotels and places of amusement. An industrial zone is provided near the railway, and no factories are allowed elsewhere. All these desirable conditions have been satisfied at Letchworth and Welwyn (see Plate 23*b*), but neither town has yet reached anything like its intended size; moreover, the object of the promoters has been partially stultified by the fact that many people from Welwyn and some from Letchworth travel daily to and from London, so that the 'garden city' becomes a dormitory and strap-hanging is perpetuated.

A 'garden suburb', such as that at Hampstead (1907, see Plate 23*a*) and at many other places adjoining our larger towns, is often properly and even attractively planned, but only serves to spread the huge mass of houses farther outwards: it makes no provision for local industry and only limited provision for social amenities. It is merely a pleasant dormitory, so leaves the main problem almost unsolved. Another school of thought advocates the building of houses in blocks and terraces rather than the 'sprawling' method of the garden city, arguing that less agricultural land is covered thereby and that a keener social sense is developed.

Others favour the erection of tall multi-storey flats, for the same reason, and it seems certain that flats will have to be built in the central part of existing towns for those (*e.g.* dock labourers) who must live near their work; others again prefer a star-shaped plan for each town, with the green agricultural areas reaching close to the centre between the points of the star. This method, however, approaches the 'ribbon-development' which is denounced by all critics.

Nevertheless all these contentious enthusiasts do agree on many major points of principle. They all agree that the present haphazard or *laissez-faire* methods must stop. They all favour a far more drastic use by the State and by local authorities of the powers which

both possess to control and regulate the lay-out and growth of towns. They all support the system of 'zoning' an area into industrial, commercial, residential and agricultural districts. They all want an adequate acreage of suitable ground to be reserved for public recreation. They are all concerned to ensure the prosperity of our farms and the facilities for growing food as near to the towns as possible. They all realize that the vast sums involved in acquiring property for street-widening could be saved in a town properly laid out to allow of future growth. They all recommend, in one form or another, the abolition of profiteering in land and site values at the public expense. They all want to pull down the slums, reduce the smoke nuisance, limit the size of our big cities, and make both life and work more pleasant for all our people. Taken together, all these points represent a very substantial measure of agreement; and it is to be hoped that squabbles between experts over minor matters of detail will be ironed out quickly so that when the war is over we can begin reconstruction at once.

It is very important to realize that town-planning, though so recent a science or art, is not a mere visionary dream as some 'hard-headed business men' still try to persuade us. It can be justified up to the hilt on strictly economic and financial grounds, even if one ignores social values, ideals and decencies; but one inevitable result of the present war is that an extensive area of several of our chief cities will have to be replanned, whether the hard-headed and hard-hearted business men like it or not, if only to re-establish them in business again. Most of us have seen some of the proposals for rebuilding the central part of London and have read vigorous criticisms of each scheme propounded. Others may have seen the really exciting proposals devised by the city architect of Coventry just before the war and now surprisingly made possible by Hitler. There will be great opportunities in Hull, Plymouth, Swansea, and other devastated towns: opportunities which make an older man envy the young architects who will have the thrilling task of building 'a new Jerusalem in England's green and pleasant land.'

The handsome volume illustrating and describing the 'County of London Plan' was published in 1943. Among its more striking proposals are the transfer of 500,000 people out of the County to allow of a suitable 'density' for the housing of the remaining residents; and for the breaking-up of the area into the separate 'communities' from which it originally grew, each with its own schools, community-centre and shops.

INDEX